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Hugh Cecil Earl of Lonsdale.

1816.

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Dedicated to The King's Most Excellent Majesty.

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THE

OUTLINES

OF THE

VETERINARY ART:

In Four Parts.

THE SECOND EDITION.

1816.

J. Compton, Printer, Middle Street,
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THE

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OR, THE

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AS APPLIED TO THE

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AND TO

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BY DELABERE BLAINE,

VETERINARY SURGEON, AND PROFESSOR OF ANIMAL MEDICINE IN GENERAL.

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LONDON:

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TO

THE KING'S
Most Excellent Majesty.

SIRE,

Your gracious Permission, so readily granted, to dedicate my last Work to you, emboldens me to lay this also at your Majesty's feet; and, if that was thought in any measure deserving of Royal Approbation, I hope this will not be esteemed less so, it having for its object the farther extension of a Subject as important as it has become popular.

With the utmost deference and respect, I beg to subscribe myself,

YOUR MAJESTY'S

Most devoted and most faithful

Subject and Servant,

DELABERE PRITCHETT BLAINE.

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Preface

TO

THE SECOND EDITION.

FOURTEEN years have elapsed since the first appearance of this Work; and as, during the whole of that period, I have been actively employed in the duties of my profession as a veterinary surgeon, so it may be supposed that, whatever might have appeared defective in the practical part of the former edition, may be pretty well made up in this. The anatomy, physiology, and general economy, of the horse, though somewhat condensed, have, nevertheless, received some considerable improvements. And, whoever will be at the trouble of comparing them, will find that the present edition has been entirely new modelled; and that some subjects which entered into the former, and which may be, perhaps, as conveniently gained from other sources, such as a History of Human Medicine, a Treatise on Comparative Anatomy, &c., have given place, in the present, to a more minute examination of the exterior conformation of the horse; a philosophical and mechanical inquiry into the nature, cause, and manner of progression; a comprehensive treatise on condition, stable management, and the general treatment of the horse, as well in health as in sickness: which alterations, it is presumed, will render the work as interesting and as useful to the amateur as to the practitioner and veterinary student. To this edition has also been added a Veterinary Materia Medica: if, therefore, in its former dress, it received the following honourable testimonies to its merits, it is hoped that, in its present improved appearance, it will be no less favourably received, and prove still more extensively useful.

'Mr. B—— had previously published the Anatomy of the 'Horse, re-published in this Work, in which he professes the 'parts treated of have been most of them taken from his own dis-'sections. So far he has a fair claim of originality.'—'The 'drawings appear extremely correct; are executed in the most

'handsome manner; and the descriptive part is very correct.'—*London Medical Review.*

'The second division of the Work is occupied with the Anatomy of the Horse, including the physiology, or knowledge of 'functions. This part of the Work is materially illustrated by 'engravings, the execution of which has considerable merit.'—'The third division is allotted to the practical part of the veterinary 'art, or a description of the diseases of the horse, ox, sheep, and 'dog, with the most approved modes of cure. From the length 'of the anatomical part of the Work, the present part is, perhaps, 'more compressed than might be wished. The classification 'adopted by the author will materially assist the student in this 'branch of medicine, who is too apt to be misled by the barbarous 'and unmeaning jargon adopted, in general, in books of farriery.' —*Medical and Chirurgical Review.*

'Mr. Blaine, we believe, is the first who has attempted, in the 'English language, a systematic view of the whole, founded upon 'scientific principles, in conformity with the modern discoveries 'in anatomy and physiology; and with the modern theories, 'concerning the nature and causes of the different morbid changes 'which the living frame undergoes.'—'In treating of each disease, 'he gives a clear and accurate description of its symptoms; points 'out its causes, states the degree of danger, and usual modes of 'termination; and subjoins a simple, rational, and scientific 'plan of cure. What a pleasing contrast this forms to the miserable productions entitled "Stable Directories," "Complete Farriery," &c., every page of which is crammed with farragoes, 'called recipes; certainly not inert, but often possessing a potency 'of the most dangerous sort!'—'It appears to us, that this Work 'is the best and most scientific system of the veterinary art that 'has hitherto appeared in this country; and we therefore recommend it to all who are desirous of acquiring a competent knowledge of the structure and diseases of the horse, and other domestic quadrupeds.'—*British Critic.*

To the above testimonies it may be added, that this work has been translated into French, German, and Italian, by the order of the Veterinary Colleges of France, Germany, and Italy. The Moniteur, of the 25th July, 1804, contained a very copious review of this work by M. Peuchet, the celebrated French Professor, and which ended with the following summary:—'Nous 'pensons à la maniere claire et simple dont l'auteur a traité chaque

'objet, qu'il a rempli son but; que cet ouvrage a le double mérite 'd'être à la portée de tous de tous les genres de lectures; que les 'personnes dont la profession est de faire la médecine des animaux 'se priveraient d'un grand secours en négligeant de le consulter, 'et qu'il peut très utilement servir a ceux qui se livrent a la plus 'importante branche de l'économie rurale, celle de l'education des 'bestiaux.'

SKETCH

OF

THE PROFESSIONAL LIFE OF THE AUTHOR.

I SHALL conclude this Preface with a sketch of my professional life. The reasons which urge me to this, will, without doubt, be misconceived, and much misrepresented; and the usual motive of an author for obtruding himself on the public, namely vanity, will, it is more than probable, be attributed to me also; but, it should be recollected that, in the following detail, I offer little ground for boast, or produce but little for admiration. In simple and plain truth, my reasons are, that I wish, in the first place, to preserve some character for consistency with the numerous classes of persons who have known me in the various situations hereafter detailed. In the next place, I wish to offer some apology to those relations and friends who have considered thàt I degraded myself by relinquishing the profession of human, for that of brute, medicine: and, further, as some little notoriety has attached to my name from my professional pursuits, so the following detail may gratify a curiosity that has, I know, been often excited. Lastly, as the present leaders of the Veterinary College, jealous of a reputation that did not immediately emanate from them, and over which they had no controul, have attempted to prove that I am not a regularly graduated veterinarian, because I never would condescend to solicit a diploma from that very school in which I was a teacher three years before the present professor was elected, and at a time when he had not even turned his thoughts towards the profession: so I hope that the future members of that body may know truly to whom they are indebted for the only *elementary* instructions they can obtain, and in what degree of relationship I stand with them as a veterinarian.

At fourteen years of age I was placed with an eminent surgeon and apothecary in Buckinghamshire, with whom I remained the

customary period of seven years; and, as his practice was very extensive, and I was the greater part of the time his only assistant, so I reaped great benefit from being very early brought into a habit of visiting the sick. At the expiration of the above period I removed to the Borough Hospitals, where I remained for two years. From the industry I displayed in embracing the various opportunities that presented themselves for the acquisition of medical knowledge, I was thought a fit person to be recommended to instruct the pupils of the Veterinary College in anatomy and the art of dissecting, and also to translate and demonstrate the public lectures of M. St. Bel, who had been appointed professor of the infant concern. In this situation I remained about twelve months, when some impolitic attempts of mine to convince M. St. B. that his anatomical ideas were incorrect, made him very wisely conclude that it would not be prudent to retain any one about him who knew more than himself (which, as an anatomist, was little indeed), and I was removed from the situation. Having, during my residence at the college, imbibed a strong attachment to veterinary medicine, I removed to Lewes, in Sussex, where I gave a course of public lectures on the internal structure and the diseases of the horse; and entered also into practice on the same. Here I commenced a very extensive course of experiments on the contracted feet of horses, and which has ever continued a very favourite subject with me. This situation was also particularly favourable to a study of the diseases of oxen and sheep, which I did not neglect, and in which I was greatly assisted by the liberality of the Sussex farmers, who furnished me with subjects; and it was here I made the discovery of the celebrated Remedy for the Distemper in Dogs, so long and so justly appreciated. But as the practice of economy was not at that time my fort, my experiments, which were expensive, and my expenditure, which was considerable, so far exceeded my income, that I was under the necessity of relinquishing these pursuits, and of accepting an ensigncy and assistant-surgeoncy in the East Middlesex Militia, where I remained till General Gwynne, who had been informed of my advancement in the veterinary art, and of my general attachment to horses, offered me a cornetcy in the 1st Fencibles, soon after made the 25th Dragoons. Most unwisely I refused this advantageous offer, but expressed a wish to get a surgeoncy to one of the troops of horse artillery. With that urbanity peculiar to the General, and which I have experienced in many other instances, he obtained it for me; and in this excellent

corps I remained more than two years, profiting in my experience of human medicine from the judicious management of the Woolwich Artillery Hospital, under the direction of the late ingenious Dr. Rollo. Nor had I less opportunity also for improvement in the veterinary art, from the circumstance of all the sick horses belonging to the establishment being placed under my inspection. It is probable I might have remained here some years longer, but, my relations becoming urgent with me to settle in life, I left the army practice, and embarked as a surgeon and apothecary in the neighbourhood of Queen Square, London. But fate at that time seemed to have ordained that I was not to remain long in one situation; for after a twelvemonth spent in this manner, I came into the possession of a considerable fortune by the death of a relative, which induced me to retire into the country. Unfortunately, I had not yet gained a prudential mode of managing money, and, after living expensively as a country gentleman for a few years, I found myself again under the necessity of entering active life. During this imprudent career, however, as much of my fortune was dissipated among horses and dogs, so it very considerably increased my experience, though the purchase was at somewhat too dear a rate. Uncertain what course to adopt, and that I might not remain entirely idle, I accepted a commission in the North Gloucester Regiment of Militia, and passed a campaign in Ireland during the rebellion; but after two years wasted in this manner, prudence dictated that it was doing nothing towards a re-establishment in life; and on the announcement of the expedition to the Helder, I offered my services to the medical board, which were accepted, and I was appointed surgeon to the second battalion of the 40th regiment of infantry, and immediately embarked with them for Holland. As this regiment particularly distinguished itself, and bore the brunt of several actions, as a proof of which sixteen officers were killed and wounded from the two battalions in one day, so my experience in the performing of operations, and in the treatment of gunshot wounds, received very considerable additions. The command of the regiment devolving into other hands on our return from Holland, rendered my situation much less agreeable than when Lord Craven commanded, by whom I had the honour of being always kindly noticed; in addition to which, Mr. Keat's system of favouritism offering some other sources of disgust, I finally quitted the army, and retired, for a twelvemonth, into Northumberland, where my days were occupied in field sports, and my evenings in

arranging the materials for the first edition of this work. But this plan of life also furnishing no prospect of future advancement, I debated what ultimate course it would be most prudent to pursue, when the practice of human medicine naturally stood foremost to my view; but it was unpleasant to reflect that I had lost some years in my start, and that my cotemporaries, from the advantage of early residence and locality, had outstripped me in the race; and that, the market being already overstocked with human surgeons, I had numerous difficulties to overcome, and additional time to waste, before I could hope to get even into tolerable practice. While thus irresolute what course to steer, the extensive success of the distemper remedy before mentioned having drawn me into numerous correspondencies relative to the diseases of dogs, I was, as it were, irresistibly, and almost insensibly, drawn into a popular practice on their diseases, which, joined to a very strong attachment to veterinary medicine in general, soon led to an extensive practice on horses also; and, at length, determined me to devote all my future professional energies to these subjects. In this almost unbeaten track I might hope to reap both fame and emolument; and that though it might not appear so honourable a calling, it was, at least, a very useful one, and, under all the foregoing circumstances, the most prudent one. Actuated by the above motives, I abandoned my wanderings, and maintained a steady perseverance in these pursuits; and from thence has resulted that popular and extensive practice on the diseases of animals in general, so well known in the British metropolis.

With those who advocate the cause of humanity I hope I may lay claim to some consideration, my exertions having been arduous and unceasing. Of canine medicine, I believe no one will dispute that I am the absolute father; and whether, also, of veterinary medicine in general, I may not be considered as one of its earliest and warmest friends, the above account is best calculated to shew. I have steadily pursued my professional duties with industry and integrity, according to the plan I originally proposed to myself; and to which I have adhered so rigidly, that a tempting offer, some years ago, made me to go to India, and a still more tempting and honourable invitation to go to Russia, of latter date, both in my professional capacity, failed to move me. I remained fixed in my original plan; and I now reap the fruits of it in a well-earned reputation, and a moderate competence.

Introduction.

IF the animals domesticated by man are essentially necessary to his comfort and convenience, no apology need be offered for attempting to reduce into a system the arts of preserving them in health, and of removing their diseases; both of which must be founded on a knowledge of the structure and functions of the animals in question: and it is these, therefore, that form the groundwork of what is called the *Veterinary Art*.

The deplorable state of this art in Great Britain, has been animadverted upon by every one who has written on the subject; and though, in other countries, the establishment of seminaries, for the express purpose of teaching it systematically, appeared to lead the way towards a better mode of practising it; yet in real improvements it does not appear that these countries have been much more fortunate than ourselves.

The principal hinderance to its advancement has been its total confinement in the hands of persons proverbially ignorant. Custom reconciles the grossest absurdities; and hence, though the value of the animals in question, and particularly of the horse, is a theme that has exercised, in every age, the pen of thousands; yet the knowledge of the means of preserving them in health, and of curing their diseases, has been regarded as a subject beneath the dignity of a man of education, and the practice as derogatory to the character of a gentleman. Thus every improvement that has been witnessed, made its way by stealth, and as it were crept into notice; usually by the exertions of some enlightened physician or surgeon, as Gibson, Bracken, Bartlet, and Osmer.

But, at length, superior to vulgar prejudices, and aware of its great utility and importance, mankind are content to consider this among the liberal arts, and to regard the profession and practice of it as no longer incompatible with the pretensions of the scholar, or the rank of a gentleman: and it is yet to be hoped, that, from the establishment of a Veterinary College, and the exertions of its *elèves*, it will not only rise in its dignity, but that its utility will become daily more and more evident.

As it is generally believed that this establishment has not yet

diffused such beneficial influence upon the art as might have been expected, so other aids appear to be wanting; and even were not this the case, a considerable time must elapse before these improvements, by means of a college, can be made general; or before persons properly instructed can be stationed over the remote parts of the country: in the mean time, therefore, any work that teaches this branch of the healing art systematically, must prove highly beneficial to the world at large; and there are few classes of mankind but will participate in the advantages to be derived from it. The possessors of horses of every description will be interested therein; particularly those of rank and fortune, whose leisure may permit them to become acquainted with the fundamental principles of the art, by the acquisition of which, they will be enabled to direct in cases of emergency for themselves. Medical men in general are interested in such a production, for their opinion is often required on cases in which analogy totally fails, but in which they might be willing to be useful.

To farriers, it is needless to say how valuable such a work may prove: the awakened attention of the public to the gross impropriety of their general practice, has convinced many of them of the necessity of receiving instruction; but which, the nature of their situation prevents numbers of them from seeking at the seminary established for that purpose.

To diffuse, therefore, generally the benefits of a scientific investigation of this subject, and to teach that art among all ranks of persons, which the Veterinary College is attempting among individuals, is the intention of the present work; and it is evident, that in such an undertaking a very wide field of information must be entered into.

The path I propose to pursue is entirely a new one; to teach the art properly, there must be a groundwork laid down; the anatomy of the body must be known, together with the laws of the animal economy, its deviations from health, the causes of these deviations, the progress of return towards a healthy state, and the modes of hastening this return. By these means, practitioners will be taught first to think and then to act, and instead of having a system of farriery in their closets only, it will exist in their minds. The former writings on this subject are few of them direction posts to improvement, but are themselves the extent of what they profess to teach. To compass the end I wish, an arrangement of instruction, gradatory and systematic, will be attempted. It will be proper

first, by a history of the art, to shew that it is defective, as it has hitherto been practised among us. When the present state of the art has been examined, and the necessity of a more scientific manner of pursuing it pointed out, with the advantages that have already been derived from the awakened attention to the subject; it will lead to our ultimate object, which is to teach the mode in which these benefits and advantages may be brought into general use.

The generality of farriers unfortunately are not willing to be put to the trouble of learning, nor to the mortification of owning they need it; hence they obstinately maintain that nothing is necessary but what is known; and that theirs is a mechanical art, learned by imitation, in common with every other handicraft pursuit.

But farriers should be aware that there is no mortification in candidly pleading ignorance; on the contrary, ingenuousness would ennoble them. Nor should this useful body of persons hastily conclude, that those who teach the reformed practice are at war with their persons, or wish to lessen their employment; on the contrary, they combat only the errors received into the art, and point out the means by which the farriers themselves may correct them, and hence, by becoming more successful practitioners, they would accumulate more business, and consequently more emolument. I by no means despair of yet seeing this useful class of men open their eyes on their own defects, and to which I think they should be drawn by every conciliatory means in the power of those veterinarians from whom instruction may be expected to be derived. In the first place, it should be pointed out that there is no honorary distinction between the *veterinarian* and *farrier*. The terms should be well explained: *farriery* is a branch of veterinary medicine only; *veterinarian* is not an assumed term simply—it is a definite appellation, to which the farrier has an equal right, if he professes and understands the diseases of animals in general; that though the Veterinary College holds out the means of attaining this art by scientific progression, yet the same means they pursue are in the reach of other persons; they possess no secret arts: the book of nature is equally open to the meanest farrier, if he pursues investigation upon equally excellent principles.

There are farriers who are sensible, intelligent, and unassuming men, conscious of their own defects; I have met with many instances of them; but there are many of a contrary cast, ignorant, assuming, and obstinate: these pertinaciously hold out against improvement, and virulently contend, that the system, as at present

practised, cannot be mended, though their practice itself proves fatal in three out of five acute cases, and ends in permanent unsoundness in four out of seven chronic or local ones. These persons look on every attempt at improvement as an unjust innovation on their right, and, on every exposure of error, as an attack upon their persons. How glaring this appears, is evident, when we find one of them saying, 'Whatever may be written by those 'new-fangled farriers, of the advantages resulting from a minute 'knowledge of anatomy, nothing in their practice has proved its 'utility; and as Gibson has so well demonstrated the anatomical 'structure of the horse, nothing further on the subject is necessary, and cannot tend to elucidate the practical part of farriery.' Such an apology for ignorance of a subject that all writers in every age have allowed is the groundwork of improvement, would amaze one, was it less common than it is; but, as this is the language of many of this class, it may be worth while to indulge a few moments in comparing the differences between the old and the new practice.

By dissections of morbid subjects, we can accurately ascertain what affection the lungs have undergone, and by this very anatomy it is that we are now taught, instead of treating horses with cordial balls, and comforting drinks, whereby the inflammation is certainly forced into gangrene, and then '*the horse died rotten*, '*rotten as a pear, and had long been unsound;*' instead of such a destructive practice, which has been in common use, we now give no cordials, but we bleed and blister profusely; and if we are luckily employed alone, or in concert with an intelligent and unassuming farrier, we certainly save our patient. To pursue the matter further; it is anatomy and physiology conjoined, that have taught us what thick wind and what broken wind are, which, till these noble studies were encouraged, were not even hinted at, except in terms, or by ideas, too vague to need refuting. Anatomy has taught the principal seat of glanders to La Fosse, beyond the possibility of doubt; subsequent investigations have thrown great light on this subject, and, as anatomical knowledge has been further extended since his time, so it was to a less advanced state of it, that we must attribute the important error he propagated, when he described the lymphatic glands for the sublingual. Bartlet adopted this error; and from a defect also in anatomical knowledge, he likewise fell into a still more barbarous one, when he directed that the haws should be cut away from the eyes, considering, as

spongy excrescences, what we now know to be necessary and important parts. The different diseases of the bowels are all, not only illustrated by morbid anatomy, but we have thereby been enabled to make the important distinction between inflammatory and flatulent cholic; this has also led to the detection of the fatal practice in use among farriers, of giving gin, oil of juniper, &c., when inflammation is the cause. It is by anatomy we know that molten grease is no stirring up or melting of the fat of the body, which has been a most gross and dangerous error of long standing; but that it is simply a throwing out of coagulable lymph, or the white parts of the blood, on the surface of the intestines, in consequence of inflammation; and hence our treatment is now judicious and beneficial. It has taught us, likewise, that strong physic is always dangerous, because what was mistaken for fat, is only the effect of inflammation. In our amended practice, we do not attribute to an affection of the shoulders, that which we now know to arise from tenderness of the feet. Thousands of suffering victims have been tortured, by ignorant farriers, by applications to these parts for chest-foundering, when the evil existed in contracted feet; which, by thus standing inactive and heated, became worse for the treatment. Innumerable other instances might be adduced, would our limits allow us.

The subject-matter of the Work I have divided into four grand divisions. The first of these comprises what may be termed the collateral branches of the art, commencing with a General History of Veterinary Medicine from its origin to the present time; and a concise account of those who have contributed, by their works, to its improvement. To which succeeds a summary of its progress in this country, by which the reader will be enabled to judge how far we stand removed from other nations in this particular, what they may be supposed to have borrowed from us, or we to have learned from them. Next, is presented a short detail of the proper means to be pursued for the attainment of the Veterinary Art. Thirdly, a minute examination of the exterior conformation of the Horse. Fourthly, a philosophical and mechanical inquiry into the nature, causes, and operations of progression. Fifthly, a treatise on condition; and, Lastly, the principles and practice of stable management, with its components, dieting, grooming, and exercise.

The second division of the Work presents an anatomical detail of the parts of the body of the *horse;* and the description is blended with a physiological account of the functions and economy

of the parts; and as the knowledge of the extremities forms one of the most essential points in the practice of farriery, I have described them separately, that the practical remarks on them might come into one point of view. I have illustrated the anatomical part of my work with plates, as I deem them of the greatest possible assistance to the acquirement of a knowledge of anatomy, particularly where recourse cannot be had to the subject itself. As figures, however they may want beauty, yet, as being all drawn by myself from my own dissections of the dead subject, I can venture to assure my readers they are correct. In the parts represented, I have endeavoured to form such an arrangement as that those most important, either in elucidating the economy of the animal, or as more immediately concerned in the practice of the art, may be particularly brought forward and represented; and, in this respect, I hope I have been rather fortunate in my selection.

The two first grand divisions are formed into sections; the third is subdivided into classes; and the fourth presents itself naturally in one mass. I have made use of the terms that are usual in human anatomical descriptions, but I have in the Index, as well as throughout the description, introduced the synonima of the farriers; and it will appear, whenever it has fallen to my choice, I have used English terms.

The third division of the Work is allotted to the practical part of the veterinary art, or a description of the diseases of the *horse*, *ox*, and *sheep*, and the mode of cure, in two parts. The first, speaking with analogy to the human, comprehends that practice which falls under the cognizance of the physician; and the second, that which is usually confined to the surgeon. I have likewise attempted something like a classification of diseases; not, I am convinced, so perfect as it may be, but such as I conceive the present state of the science best admits of: had I attempted a more strictly nosological arrangement, I might have bewildered the uninformed, and, perhaps, have lost myself: but some classification of diseases has great advantages, for, as some remote parts of the body follow the same laws in structure and economy, so they are liable to similar diseased affections. The inflammation of mucous membranes produces similar appearances in many respects, whatever part of the body it takes place in. The inflammation of the cellular membrane producing phlegmon and abscess, is the same, whether it occurs on the cheek or on the buttock; hence a knowledge of these diseased affections can be rendered more

comprehensive by their being classed under one head, than when suffered to remain scattered through all the varieties to which, from the different parts affected, they have hitherto been. This classification forms twenty heads or classes; ten of which include the medical part of the art, and ten belong to the surgical; after which, the operations that occur in farriery are introduced.

The fourth division comprehends a full account of the articles in use among veterinarians as medicaments. A Veterinary Materia Medica is particularly wanting, that the junior practitioner may not be misled into a belief that a few articles only of trifling expense are requisite in this practice.

I have added a very copious Index, that, by this means, those subjects that are otherwise disjointed, may come into one point of view. By this, the whole that has been said on any article throughout the work, appears at once. By this, likewise, the reader will be enabled to find immediately any subject he wishes, and this under any term that is familiar to him, as the subjects are arranged under all the names in common use, as well received, as classical and scientific. Whenever a technical name, or any article, is not easily met with in the table of contents by the term in common use among farriers, on a reference to the index it may be found.

OUTLINES

OF THE

VETERINARY ART.

Sect. I.

HISTORY OF VETERINARY MEDICINE.

MAN, ever ready to improve surrounding objects to his advantage, would not be long without subjecting to his use such animals as his reason led him to suppose would prove most useful, or his experience had proved were the most tractable. Animals, when domesticated and removed from a state of nature, would not long continue in perfect health; and hence their owners would be led to search for such remedies as their small stock of information pointed out: thus veterinary medicine must, in some degree, have been coeval with the domestication of the animals in question. It is probable, that the practice of that branch of it, called *farriery*, was of latter date; inasmuch as the subjugation of the horse himself was subsequent to that of other domestic animals. At what exact period this took place, is not necessary to inquire; yet that it was very early cultivated, we have sufficient testimonies: these reach to long before the Christian æra. Indeed, reason would convince us, that as man beheld his own diseases removed, or lessened, by the application of certain means, he would be led to make similar attempts upon the complaints of such animals as he had domesticated. Homer, who flourished 900 years before Christ, celebrates the management of the Greeks with regard to their horses, and the pains that were bestowed to train them for their courses; hence, there is no doubt, that at this period the treatment of animals under disease, fell to the charge of a particular set of persons. Xenophon, a Greek philosopher, poet, and warrior, wrote a treatise on equitation, *De Re Equestri*, nearly 500 years before the birth of Christ; in which he quotes several authors who had written on the same subject long before; hence we may naturally conclude the treatment of the diseases of the horse had been attended to before this. The term, *veterinary*, appears, also, a very antient one, as may be learned from the relics of literature, saved from the devastations of the barbarous ages; in which are frequently met with, the terms *veterinarius*, and *veterinarius medicus*. It appears derived from the Latin appropriate to

beasts of burden, *veterina ad vecturam idonea.* Hence, veterinary medicine signifies properly the treatment of the diseases of animals used for burden: but has been understood as applying to the diseases of animals in general; and, with us, is more immediately applied to the treatment of horses; though, strictly speaking, farriery is only a branch of veterinary medicine, though the most important. The French use the term *vétérinaire* for the science of animal medicine in general, and Hippiatre, for that which treats of horses. '*Hippiatre, médecin du cheval; d'ippos, cheval, iatros, médecin.*' Diet. d'Hippiatrique. By the investigations of Democritus and Hippocrates, attention was turned, in some degree, towards anatomy, or the internal formation of the body; and as these early researches were practised only on brutes, so it naturally led, at times, to an observation of morbid appearances, and which must have paved the way for attempts at counteracting their diseases. That it did so is very evident; for we are informed it was, at this time, deemed so important, that the great Hippocrates himself wrote a treatise on the subject. It farther appears, from antient testimony, that it was usual for the most celebrated physicians to make this art a part of their study, and that many of them practised indiscriminately upon man or beast.

'On peut aussi remarquer que ces deux médecins des hommes
'& des brutes, étoient autrefois exercées par une même personne;
'Apsyrtus nomme souvent un médecin de chevaux, & quelquefois
'simplement un médecin. Ansi, au commencement du I livre, il
'y a pour inscription, Apsyrtus à Hippocrates, medecin de chevaux,
'salut; & au chap. 22, Apsyrtus à secundus, Medecin de chevaux
'salut: au chap. 42, Apsyrtus à Statilius Stephanus, médecin
'salut; & au chap. 69, Apsyrtus à Hegesagoras, tres-bon méde-
'cin, salut. Tous ces hommes là, pratiquant la médecin sur les
'chevaux, consultoient Apsyrtus touchant leurs maladies les plus
'importantes.'—Dict. d'Hippiatrique, tom. ii, p. 411.

It will appear from this, that the veterinary art was deemed, at this early time, both important and honourable; and that it was as regularly practised as human medecine, not only by physicians in general, but, probably, by persons set apart for the purpose. We have not, however, any written remains on this subject, I believe, till after the Christian æra; from the beginning of which we have several fragments. Valerius Maximus mentions one Herophilus, a farrier, *equarius medicus;* who had written; but his works have not been preserved. It was fifty years only after the birth of Christ, when Columella wrote his celebrated treatise, in which he mentions an eminent cotemporary author, Pelagonius, but of whose works I believe we have no remains. From this time, till about the third century, we have little transmitted down to us, but the names of some of those who either practised or taught this art. Nevertheless, these testimonies are sufficient to shew that, from the earliest ages, veterinary medicine was in the highest estimation.

It was about 300 years after the birth of Christ, when the true

father of this art appeared; the veterinary Hippocrates, *Vegetius*, who wrote his *Vegetius De Arte Veterinaria*, which was the oracle of many succeeding ages, and upon which many of the future improvements were built. Vegetius likewise gives an account of all the most celebrated authors and practitioners before him, among whom the most worthy of notice are Columella, Apsyrtus, Chiron, and Pelagonius. The art appears to have gained little in addition for several centuries subsequent to this; though some writings on the subject appeared, of which we have only extracts handed down to us, and for which we are indebted to Constantine Porphyrogenet, who commanded that all the works on this important subject that had appeared should be collated, and the substance of them formed into one body, for the future guidance of practitioners, and the preservation of the antient opinions. A copy of this compilation by some means escaped the general devastation that took place, as well as a copy of Vegetius; and it is to these we are indebted principally for our knowledge of the state of this art in antient times.

The irruptions of the barbarous nations destroyed the Greek and Roman learning; hence on the restoration of it in the fifteenth century, few remains of this valuable art were left; and as iron shoes were began to be generally worn by the few horses that were kept at this period, so what little attention was paid to their diseases devolved on their smiths, and that which regarded other animals was practised by the goatherds, shepherds, &c. But in the sixteenth century, when Europe became still more enlightened, and the liberal arts encouraged, the necessity of a cultivation of this useful branch appeared evident. Francis the First, who has generally been termed the restorer of learning, ordered the collection of Constantine's to be translated from the original Greek into Latin by Ruelli, a physician; from which it was soon afterwards rendered into Italian, German, and French; and by this means became dispersed over Europe. Nearly at the same time, likewise, the works of Vegetius became translated into several languages. From this period we may date the improvement of the art; and, during this century, many treatises upon the subject appeared in different parts of Europe: among those to whom the science was indebted, may be reckoned the celebrated historian Gessner, who compiled from Aristotle, Pliny, Ælian, Oppian, Varron, Columella, Vegetius, and others, an extensive history of animals. The part treating on domestic animals was enriched with some valuable remarks on their diseases. Vincent, an Italian author, published recipes for the cure of all the maladies of horses in the first half of this century; and soon after the celebrated works of Laurentius Ruffius appeared in Latin. In the latter half of this century appeared the natural history of ruminant animals, with the phenomena of rumination, by Æmiliano, published in Venice. *Libro de marchi de cavalli, Venice* 1588; *Hippol. Bonacossa, tractatus, equorum, Venice* 1590; *L'Hipposteologie, par J. Hernard, Paris* 1599. It was, I believe, in this century also, that the celebrated and learned Leonarda da Vinci, a most eminent Italian

painter, published his anatomy both of the human body and of the horse; which works are extremely scarce: there is a copy of the latter, I believe, in the queen's library. This illustrious author is not usually mentioned in histories of medicine; though, at the time his works appeared, they far surpassed all his cotemporaries.

During the seventeenth century, the art gradually advanced; and numerous were the publications on the subject that appeared in every country. I shall only notice such as appear to have more materially benefited it. The names I am acquainted with are Cæsar Fiarchi, Pasqual Caracciolo, Clementi Corti, Ruini, Dumesnil, Beaugrand, Delcampi, Epinay, Liberati, Debaurepert, Hobokeni, Peyeri, Blasius, Solleysel, and others. Fiarchi wrote an Italian treatise on horsemanship, in which he introduces a very rational method of shoeing, forbidding the use of calkings as destructive to the feet, and, where absolutely necessary, recommends a small one only on the outside heel. The *infermita, & suos remedii, del Signor Carlo Ruini*, was published in Venice, 1618. It is from this celebrated and elegant work that Snape, Gibson, and likewise all the French authors, have copied their plates. I have never seen but one copy of it, but I was surprised at the elegance of the plates, and for the time they were published in, their comparative accuracy. In 1654 the *Grand Maréschal Francois* appeared, a very large and meritorious work, said to be composed by several hands. In 1675, Gerard Blazius, a Dutchman, published, in Amsterdam, a treatise on the anatomy of the horse, with plates, which was highly spoken of. In the latter end of this century, 1698, the art received a very great addition from the elaborate work of Sollysel, which must ever be considered as even a national honour. Nor can we cease regretting that this excellent author had not received a general medical education. Sollysel's attention was drawn to this subject from his situation as manege or riding master, in whose hands the treatment of the diseases was very generally confined; we therefore observe, that almost all the treatises on this subject, in this century, are combined with the arts of the the manege, and the modes of riding; and it is to this that we must principally attribute the slow improvement in the art. For the riding masters being usually men of some science, who, in most instances, professed a knowledge of the diseases of horses, from their habits leading them to be so much about the persons of the animals, it was thought less necessary for medical men to attend to the art. But it was not likely to reap any solid advantages from men of this stamp, for they must, of course, be destitute of the proper means of forming a well grounded practice upon a knowledge of the animal economy, and an acquaintance with the anatomy of the animal. I have, therefore, ever regarded the treatment of the diseases of the horse by the riding masters, and the writers on the manege combining their descriptions, with that of the derangements to which the animal is liable, as the most serious hinderance to the art; for though at the moment their practice would unquestionably be more judicious than that of either a groom or blacksmith, who were usually the next

persons in command on these occasions, yet as it prevented the necessity of a more scientific plan being so evident, the material and future improvements were more retarded than would have happened, had its errors been more conspicuous, by the more striking barbarity of grooms and blacksmiths. Sollysel was the first who objected to burning for the lampas, as dangerous and absurd. He first reprobated the bleeding in the palate in fever as useless, and pregnant with mischief, from the liability of wounding the palatine artery. He taught the impropriety of introducing feathers with stimulating substances into the nose, as the inflammation occasioned might produce ulceration and the glanders. He likewise pointed out the danger and folly of tying down the testicles, when they were drawn towards the abdomen by pain and irritation, but directs that means should be used for lessening the irritation.

The eighteenth century will ever make a distinguished figure in the annals of history, for the great advances that took place in the liberal arts in general; among which none experienced a greater alteration than Farriery. As commerce drew wealth into countries, and luxury followed riches, so the number of horses increased and their value augmented. The writers of this century were numerous; I shall notice only the most eminent. In 1734, Mr. Garsault translated Snape into French. In the same year, I. and G. Saunier, two Dutch practitioners, published their celebrated work. In 1742, the Amphitheatrum Zooticum of Valenti appeared. In 1749, Linnæus published his Pan Suecus, which is rather an account of the habits and manners of domestic animals, than any treatise on their diseases. It was about the middle of this century, also, that several of the continental countries, opening their eyes more fully on the importance of this branch of science, established seminaries for the purpose of teaching it scientifically. One of the first, as well as the most eminent of these, was established at Lyons, over which was placed the celebrated Monsieur Bourgelat. Monsieur B. was a voluminous author. In 1750 he published his Elements of Farriery, in 3 vols. In 1765, his Materia Medica, for the use of the veterinary pupils. Soon after, his Elementary Treatise on the Anatomy of the Horse appeared, which is the most complete work of the kind that has ever yet appeared. In 1766 he published his Elementary Botanical Demonstrations, for the use of the pupils of the veterinary college. He likewise gave to the world a treatise on bandages applicable to the horse. About this time, likewise, the King of Sweden granted some honourable privileges to those who professed this art, which drew some of the best practitioners from France and other countries. In 1752, appeared the celebrated work on Natural History composed by Messrs. Buffon and Daubenton; which, as it contained many hints on the conformation of animals, and on their economy and diseases, therefore may be ranked as an acquisition to the art. About this time likewise appeared the well known work of Guereniere, but which had no merit as a veterinary treatise.

As a cotemporary with Bourgelat lived the elder La Fosse, a name

that will ever be respected in the annals of veterinary medicine. La Fosse made numerous improvements and discoveries, which he usually communicated in the form of memoirs to the Royal Academy of Sciences in Paris. In 1754, he collected these into one volume, which was quickly translated into other languages, a sufficient proof of its merit. The first of these memoirs describes the foot and its diseases. The second is the celebrated communication on the glanders, wherein he shews this to be a local inflammation of the pituitary membrane, and recommends the use of the trepan; but which, it has been said, was not a new mode of treatment, having been practised in England before. The third of these memoirs described the use of the lycoperdon, or puff-ball, in hæmorrhages. The fourth contained his celebrated improvements in shoeing; and the fifth exposed the error of attributing an epidemic, then prevalent, to the bite of the shrew mouse, which was the generally received cause. Most of these were translated into English by Bartlet, and from them it may be judged how much the art was indebted to him. In 1755 appeared Garsault's *Parfait Maréchal*, which Buffon frequently quotes; but it appears not to merit any distinction in this place. In 1756 there was published, in Paris, a translation from the Swedish, of an Essay on the Raising and Perfecting Cattle, which was very highly spoken of, but which I have never met with. It was at this time, likewise, that the first grand Dictionary of Arts and Sciences came out, in which M. Bourgelat and Genson were engaged. It appears that the veterinary articles furnished by these gentlemen occasioned some controversy; for we afterwards find some remarks on them, published by M. Rondon, farrier to the great stables of the king. In 1763, the *Maison Rustique* made its appearance in Paris; but the author was not generally known. About this period, likewise, some treatises on different parts of the art were written by Brecand, Boutrolle, Le Clerc, Barbaret, a physician; and Bartlet's works were translated into French at the same time.

In 1766, La Fosse, junior, who occupied the same situation his father had held (that of farrier to the lesser stables of the king), presented his *Guide du Maréchal*, a work well known in this country, though it has never been translated into English. The anatomical part is concise, and accompanied with some good plates. But his principal production was the *Cours d'Hippiatrique*, which was then, and still remains, the most expensive and superb work that has appeared on the subject in any language. It consisted of sixty five folio anatomical plates, coloured after nature, with corresponding descriptions in letter-press, and first appeared in 1772. After this he published his *Dictionaire d'Hippiatrique*, in 4 vols. This valuable work is but little known in England, but at the time it appeared it was certainly the best practical system of farriery in existence. In 1776, appeared a very extensive work by M. Vitet, who styles himself doctor and professor in medicine. Had the execution of this been equal to the plan on which it was intended to be formed, it would have been an excellent one; but with a very elegant systematic arrangement, which

the borrowed from a foreign author, and a most extensive collection of subject, it is but an indiscriminate compilation of good and bad. Its principal merit consists in an analysis of authors, to which I am indebted for an acquaintance with the names of many of those who have written on this subject. There was about this time published in Spain a very voluminous work on veterinary medicine, in nine volumes; but of which I know no particulars.

After the death of Bourgelat and La Fosse, we hear of no character of any eminence for some years; but it appears, that since the revolution, the subject has again been more diligently studied, and the names of Hartman, Chabert, and Huzard, stand forward. Soon after, or about the time above alluded to, there appeared a considerable work, called *The Rational Dictionary of Medicine, Surgery, and Farriery*, in 6 volumes; and very soon after a *Veterinary Dictionary*, by Buchoz, but it has no merit superior to that of La Fosse. In 1787, Monsieur Chabert published a *Treatise on the Mange* of horses; since which he has likewise published upon the *Peripneumonia* of black cattle. There has also appeared an essay on *the Grease* of horses, which gained the prize medal of the society for the promoting the health of animals; to which is joined a report on *thick wind*, and on *broken wind;* but I am not aware who is the author. In 1788 there came out a *Treatise on the Haras*, with the method of shoeing, cutting, and all the lesser operations, translated from the Spanish of Hartman, by Huzard. Likewise, *Instructions and Observations on Domestic Animals*, with remarks on the breeding, rearing, buying and selling; with an analysis of previous authors, by Chabert, Flandrin, and Huzard.

The above authors have also published, conjointly, a *Veterinary Almanack*, containing the history and progress of animal medicine, since the establishment of the veterinary schools. In 1791, Monsieur Lompaigieu Lapole, veterinary surgeon, published *Observations on the Health of the Animals of St. Domingo*, dedicated to the Veterinary College at Alfort. In 1797, Monsieur Chabert and Monsieur Huzard published, by order of government, a *Treatise on ascertaining the Existence of the Glanders, the Means of preventing it, and destroying the Infection.* In 1809 appeared *Cours Complet; ou, Dict. Universel d'Agriculture, Pratique d'Economie, Rurale et Domestique, et de Medécin des Animaux*, par l'Abbe Rozier. The principal veterinary articles were furnished by M. Chabert, professor at the veterinary college at Alfort; M. Fromage Defeugré, veterinary surgeon in chief to the gens d'armes, and member of the legion of honour; L. M. Lafosse, veterinary surgeon, associate of the Imperial Institute of France; M. de Chaumontel, ci-devant professor of the veterinary school at Alfort, &c. &c. Besides these, there appears a very numerous list of minor veterinary contributors. From a notice published in the Journal de l'Empire, one may be led to conclude that this extensive work contained nearly the whole body of the veterinary art as practised in France.

The *Cours d'Agriculture Pratique* appears to have given rise to a

veterinary journal commencing April 1810, to be continued monthly; in which the literary contributions of veterinarians of all countries are solicited. It is edited by M. Fromage Defeugré, and its first number, now before me, presented to me by its learned author, consists of a treatise on the fractures of domestic animals. We must not omit to notice among the latter publications a *Manuel d'Hippiatrique* by the youngest La Fosse (grandson of the original writer), which has passed through several editions, and is much esteemed. It was principally written for the use of army veterinary surgeons. If this work was translated into English, it would make a very valuable addition to our stock.

I have thus brought the history of this art on the Continent, in a concise manner, down to the present period; and though by the numerous aids before mentioned, and by the establishment of veterinary seminaries, the art has assumed a more regular and scientific form; yet I do not think that, in the treatment of internal diseases, our neighbours have to boast any superiority over us: on the contrary, from a candid and attentive examination of the matter, I think that though we set out much later in the race, we have already outstript them in our pathology at least. This appears to arise principally from an adherence, on their parts, to the humoral pathology, by which the treatment of internal and acute diseases has continued inert and unsuccessful. Their prescriptions have been filled with decoctions of simples, and they appear unacquainted with the medicinal virtues of the more active remedies in use among us. Under an opinion that the blood and humours are the constant seat of disease, they are continually washing them sweet with correctors, entirely unmindful of the derangements of the solids, and of the connexions between living blood and living vessels: but, as the pathology of Cullen is now general, not only in France but throughout the Continent, this will lead to an adoption of the improvements of John Hunter; and when by these means the errors of the humoral pathology are banished, improvement will rapidly proceed.

During the reign of terror, in the first years of the revolution, the veterinary art, in common with other scientific pursuits, suffered some checks; but when the republic became established, its importance was not overlooked, and it was early decreed that veterinary medicine should occupy a place in the first class of the new grand academy: but from this time to the present, none of the leading characters in this branch have produced any great specific work on the subject, but the more important improvements that have been made, have been communicated through the medium of periodical publications, and these principally of the agricultural kind. Indeed it appears to be a favourite mode on the Continent to unite, as much as may be, these two branches of rural economy into one stem.

Sect. II.

HISTORY OF VETERINARY MEDICINE IN GREAT BRITAIN.

THE veterinary art in this, has been similar to that in other countries, buried in the grossest ignorance; and most of our improvements we have been content to borrow from our neighbours. During the seventeenth century, manege riding was very prevalent in this kingdom, which we likewise copied from our continental friends, and, consequently, we had German and French riding masters in abundance, who took the direction not only of the actions, but of the health of the animal, into their hands; by which domestic improvement became neglected, and foreign publications alone studied. But as horse-racing and hunting became prevalent, so the manege declined among us. Still the treatment of diseases remained in the hands of those immediately placed about the animals; and, as grooms and blacksmiths are usually less enlightened than riding masters, so it was a retrograde step to improvement; and now and then only was there a feeble and individual attempt to rescue this noble art from oblivion: which effort soon ceased to attract attention, and still sooner to excite amendment.

Blundeville appears to have been one of the first veterinary writers in this country: he lived in the reign of Elizabeth. His work appears chiefly a compilation from antient authors, of which he translated several into English. His ideas were fettered with his attachment to the manege, and consequently introduced the errors and absurdities with which that system was then prevalent. Subsequent to him appeared Mascal, Martin, Clifford, Burdon, on whom Bracken published notes, and others. Nearly about this time, also, lived the celebrated Gervase Markham, whose Treatise on Farriery, though strictly empirical and grossly absurd, went through numerous editions, and became the guide and waypost of almost every practitioner. This wretched publication was translated into French, 1666. During the reign of James the First, there were many other lesser publications, some of them originals, and some translations from the Italian, German, and French. Among the former, De Grey is more generally known. The next in order, appears to have been the superb work on horsemanship, by the Duke of Newcastle, but has little connexion with the veterinary science. Succeeding this appeared *The Anatomical Treatise on the Horse*, by Snape, farrier to Charles II. His plates are mostly copies from Ruini, and a few of them from Saunier; but not so well executed: his descriptions are likewise taken from these authors; and where he has deviated from them he has made the human body his guide. In his description of the eye, he mentions nothing of the membrana nictitans, and describes the omentum as reaching to the pelvis, with numerous similar instances: it is said, he projected a larger work on diseases, which he never lived to execute. About this time, an

epidemic contagion raged among the black cattle of this country, which produced many publications on the subject; one of which was much read, and is still in many persons hands, by Dr. Layard. In the reign of George I, Sollysel's celebrated work was translated from the French, which had, in some measure, an influence in combating the general errors at that time prevalent; for at this time it was very customary, in some diseases, to tie or bar the veins. In the founder, the legs were tied, that the inflammation might not proceed upwards; which inevitably occasioned mortification, or loss of the hoofs. In affections of the head, the cervical ligament was bored through with a hot iron, and the pole evil frequently produced. A cough raised a supposition that the horse had swallowed feathers, or hen's dung, and he was treated as skilfully as such an ingenious, supposition would dictate: this, among grooms, is not yet done away. A stumbling horse had his nose slit. Some diseases were supposed to be occasioned by the bite of shrew mice; and even to this day, among country people, the fern owl, or eve jar, is supposed to inflict a disease on calves as it flies, by striking them, but which is occasioned by a species of œstrum, or gad fly. The harmless hedgehog long lay under the obloquy of sucking cows. It is therefore evident, that Sir William Hope's translation of Sollysel must have contributed greatly, among the intelligent, to place these errors in a proper point of view. About the middle of the last century, the art experienced considerable improvement by the labours of Mr. Gibson, who was originally a surgeon to a regiment of cavalry; from which situation it is probable he was first led to turn his attention to the diseases of the horse; and by which he was at length enabled to present the best treatise on farriery that had appeared in the English language. It is said, he afterwards lived in Duke Street, Grosvenor Square, where he practised with great reputation. He appears to have written several books; but his principal work is that above alluded to, which was published in quarto with anatomical plates, copied from Snape or Ruini; and called *The Farrier's Guide.* But Mr. Gibson and his cotemporaries, and, indeed, the whole of his predecessors, always began where they should have ended: they gave rules for the treatment of diseases, but they never taught what disease was, by explaining the structure, functions, and economy of the animal body, when in health. What use, therefore, Gibson was to the art, arose only from the meliorated system those would pursue, into whose hands his book fell; but inquiry was not stirred up, and the improvements he pointed out, there rested: it was a superstructure without a base, consequently nothing more could be built on it: it was an empirical practice, without a possibility of ratiocination; which, however proper in the darker ages, when there were no data to ground opinions upon, would now be destructive to the best interests of the subject. But, though his anatomy was incorrect, and treated in such a manner as to be useless, yet his treatment of diseases was generally very judicious, and his account of

symptoms accurate and interesting: and, as he was guided mostly by his own observation, so he became the best writer and practitioner that this country had produced.

As a cotemporary with him, lived the celebrated and eccentric Dr. Bracken, who was a physician of great abilities, and extensive knowledge in his profession; a man of considerable erudition, a sportsman, and a wit of a peculiar cast. His works have been as much admired and read for the peculiar style in which they are written, and that peculiar freedom and non-observance of rule or form, as for the real information they contain.

Though there is great ingenuity in his writings, and though, in many respects, he improved upon Gibson, yet, as a practical work, his was much inferior: nor was his information given in a way that could benefit the generality of his readers. Independent of his style being too peculiar, and his reasoning too abstruse, for farriers; his manner of pursuing his subject was so desultory, that few readers had patience to follow him. Nevertheless his works, which were several, and passed through many editions, have raised him a fame that can only die with the art.

Bartlet was a successor to the two former, and was likewise a surgeon, who formed himself on the model of Gibson and Bracken, culling all their excellencies, and giving the sum of their treatment in a much more compendious form, and wholly practical. Bartlet likewise enriched his works, and benefited the art, by translating La Fosse's improvements and discoveries. But he was simply a copyist and compilator, and attempts no addition of his own, except a cruel and absurd alteration in the mode of nicking. It is evident, that Bartlet had not, when he wrote the first editions of his work, seen much practice; and, throughout the whole, it is apparent he had paid no attention to the anatomy of the horse; he even fails in attempting the description of the tail, which should have been his particular study. Besides his *Gentleman's Farriery*, he published a *Veterinary Pharmacopœia:* the former work was translated into French. Bartlet's principal help to the art, was the introduction of a much better mode of shoeing, or, at least, of managing the feet, by his translation of La Fosse.

To him succeeded Osmer, who was likewise bred a surgeon, but practised the veterinary art in Oxford Street. He appears to have been an eccentric but very ingenious man. His *Treatise on the Lamenesses of Horses*, with an improved mode of shoeing, is most deservedly esteemed. His system of shoeing perhaps receives its greatest compliment, when it is known that it is that adopted by Mr. Morecroft, with very trifling alterations. He first commented upon La Fosse's method, pointing out the excellence of his mode of treating the feet, but that the short shoe was inadequate to the support and protection of the foot in the present improved and hard state of our roads. The practical part of this treatise on lamenesses is likewise excellent; but his reasoning is sometimes defective.

From the above works there were soon many compilations made, which were generally below mediocrity: amongst which, one called the *Farrier's Dictionary*, though a very wretched composition, met with a very rapid sale. I must except from these a small treatise by a Mr. Blount, surgeon, which is above the common class, and worthy of notice from an ingenious contrivance, depicted on a plate, for securing a fractured limb. Mr. Clarke, of Edinburgh, the king's farrier for Scotland, soon after this, gave the world his excellent *Treatise on Shoeing and Diseases of the Feet;* and which has been since followed by one on the *Prevention of the Diseases of the Horse.* Nearly at the same time, or very soon after, the public were indebted to Lord Pembroke for his work, which, though professedly written on the management of dragoon horses, contains some excellent observations on shoeing, and the general treatment of the animal. Lord Pembroke derived the principal of his medical hints from Mr. Clarke. Whether it was previous or subsequent to the appearance of these latter publications that Mr. Stubbs published his elegant *Plates of the Anatomy of the Horse,* I have not, at this moment, the means of ascertaining; but it was much about this period. Mr. Stubbs was a very eminent horse painter, and, to a high professional excellence in his art, added a very considerable knowledge of the animal frame, particularly of the horse; but Mr. S. appears to have gone too far as a painter, and not far enough as an anatomist. From these periods, till the establishment of the Veterinary College, the attention of the public was occupied by Mr. Taplin. This gentleman likewise began his career as a surgeon, but turned aside to the then more profitable track of farriery. Mr. T. set out by decrying all that had gone before him, and all that were in practice with him; yet his works were compilations from those very authors whom he abuses, and from whom, after abusing egregiously, he copies literally. Unfortunately for this gentleman, from the late improvements, the public had learned to distinguish in this art, as well as in others, between scientific investigation and verbose quackery; and poor Taplin lived long enough to find his writings despised and himself neglected.

HISTORY OF THE VETERINARY COLLEGE.

I now come to a period, from which the principal improvements in this art must be dated, and which will ever remain a memorable epoch to the veterinary amateur: this was the establishment of the *Veterinary College.* We are informed, in Monsieur St. Bel's works, he was born at Lyons, in France; that he became junior professorial assistant to the royal veterinary college, and, afterwards, anatomical professor to the veterinary college at Montpelier; but, that the commencement of revolutionary principles in France induced him to come to this country, where he had before been in 1788, and published proposals for instituting a veterinary school,

but without success. His second visit, in 1790, was more successful; for, on his again renewing his proposals, they were noticed by the agricultural society of Odiham, in Hampshire, which had lately entertained the intention of sending two young men into France to study the veterinary art; but, on their acquaintance with Monsieur St. Bel, they gave up this idea, and appointed a committee of gentlemen to consult with him on the means of pushing into effect a plan that might tend to establish farriery on a scientific and rational basis. These gentlemen, with several others, who saw the utility of such a measure, uniting, proposed to form an institution, called *The Veterinary College of London*, and to appoint M. St. Bel to the professorship, with myself as his assistant.

From the first appearance of this institution forming itself into a regular establishment, the number of subscribers daily increased, and, at last, a president, vice-presidents, and directors, were chosen from among the nobility, and other distinguished characters, who felt interested in it.

Soon after this, a house was taken at Pancras, and pupils were admitted to board; but, from the difficulty of regulating the concerns, and, probably, from some domestic reasons, the professor did not at first push into effect any active or regular system of instruction. To me, it has ever been a matter of surprise that it was established at all, with M. St. Bel at its head. That he was an ingenious man, and that he probably understood the manege, and was indefatigable in promoting the interests of the college, no one will deny; but no one of those who most strongly supported him, will believe that he was fitted for his situation. His treatise on shoeing was ingenious, and he, I believe, had made himself well acquainted with the principles and practice of this branch of the art; but the part which treats on the diseases of the horse is a full proof of what I have advanced, and which never, I believe, sold out the first edition. It must have been only from a wish that the college might be established, and from a supposition that no person then in the kingdom was able to undertake its management, that his examination, which took place in 1792, by the most eminent medical men of the day, was passed over as satisfactory. Nevertheless, M. St. Bel was possessed of such good natural abilities, he had the welfare of the institution so much at heart, and, I believe, when his mind was at ease, had so much application, that I make no doubt his deficiencies, had he lived, might have been in a great measure made up. In March 1792, it was resolved, that a temporary stabling for fifty horses, and a forge for shoeing, should be built near the house taken for the college. But in August 1793, M. St. Bel was attacked with an illness, which proved fatal in about a fortnight. His remains were interred in the vault of the Savoy chapel, in the Strand, at the expense of the Veterinary College.

M. St. Bel's works were an *Essay on the Geometrical Proportions of Eclipse; Lectures on the Elements of Farriery;* the *Art of*

Horse Shoeing, and Diseases of the Feet. And *a volume of posthumous works*, collected for the benefit of Mad. St. Bel. The treatise on the Geometrical Proportions of Eclipse appeared soon after M. St. Bel became known, and paved the way for his future promotion, by gaining him many admirers and patrons.

It assumed the elegance of its style from the assistance of the accomplished Mr. Penn, a descendant from the colonial founder of Pennsylvania: the subject matter itself may be seen with little alteration, in the first volume of Bourgelat's Elemens d'Hippiatrique, published at Lyons in 1750; where the same tables, and nearly the same proportions, appear. It has been proved likewise, by the elegant essay of Mr. Wilkinson on the Motive Power of Animals, that his admeasurement was incorrect, and consequently his whole thesis erroneous. Nor can his Lectures on the Elements of Farriery claim any greater originality; not only the substance, but frequently a literal translation of La Fosse, appears in them, collected from the Dict. d'Hippiatrique.

On the death of M. St. Bel, the public attention was of course engaged in considering on whom the vacant professorship would devolve. I was removed to a distance; my connexion likewise with the college had appeared to have ceased, and, in fact, my experience at that time had been so very small, and my opportunities of acquiring veterinary knowledge necessarily so confined, that I could not be considered as eligible for the undertaking: I was, nevertheless, applied to, to propose myself as a candidate. Neither at that time had any of the college pupils had opportunities of distinguishing themselves sufficiently to attract notice; consequently all eyes were directed towards Mr. Morecroft, who was then in private practice as a veterinary surgeon. Mr. M. was originally a student of human medicine, but who had also studied veterinary medicine in the French schools, and was universally considered as possessing extensive information on the subject. Mr. Coleman was also a medical pupil of the Borough Hospitals, who had distinguished himself by some physiological inquiries, and had lately, by the advice of his friends, engaged in some experiments on the diseases of the eyes of the horse: but his designs had never, I believe, reached further than this, nor had his attention at that time ever been engaged beyond that point. Between the eligibility of these two gentlemen there could, therefore, be no comparison. The fitness of Mr. Morecroft was, however, so nicely balanced by the interest of Mr. Coleman, that it was determined to unite them in the professorship. But most unfortunately for the institution, Mr. M. soon seceded, and Mr. C. was appointed sole professor. The general establishment now received some new modulations; a handsome theatre for the delivery of lectures, a dissecting room, and a museum likewise, were erected. A medical committee of assistance was also appointed, consisting of the most distinguished medical practitioners in London: by these gentlemen the pupils were to be examined, and, if found to have acquired a sufficient knowledge of the art, certificates were to be granted them.

It was finally determined, that an annual subscriber of two guineas should have the privilege of sending two horses to the college, to receive medical assistance, the proprietor paying for keeping only. A subscriber of twenty guineas had this advantage made perpetual. Pupils are now admitted to the practice of the institution, which, from the erection of a very extensive infirmary, and the encouragement it has received from the subscribers, has become a considerable field of medical practice. A *regular* course of lectures *(i. e. they ought to be regular)* is given throughout the season; private dissections are carried on, in which the pupils have, *or at least ought to have*, the benefit of the instruction of the professor or his assistant. These advantages are received for twenty guineas, paid by each pupil on his entrance. It should not be omitted in this place to note, that, by the liberality of the distinguished characters who compose the medical committee, the pupils are admitted to their lectures gratis, and this spirited example has been followed by several other professors of human medicine. I should be inexcusable, also, if I proceeded without a tribute to that active promoter of every branch of the healing art, Mr. J. Hunter. Veterinarians will ever remember with gratitude how much they were indebted to him for his zealous promotion of this establishment. The country at large also has felt this a national concern, and has fostered it as a rising plant; in proof of which, the British Parliament has annually voted a sum for its support: and, as an inducement to young men of education and respectability to become students, his Majesty has granted the rank of commissioned officers to such veterinary surgeons as may be appointed to regiments.

Mr. Coleman's professional works, since his succeeding to the college chair, have been, first, a pamphlet *On the Formation and Uses of the Natural Frog of the Horse, with a Description of a Patent Artificial Frog.* Even by the author's friends, this was not considered a fortunate production. However good the principles, and some even doubt them, the application was found impracticable. In fact, this youngling was got by Theory, his dam by Inexperience. But, perhaps, this was neither the first nor the last theoretical error of the ingenious professor. Mr. Coleman's second veterinary publication, however, whether we consider the importance of the subject, the ability displayed in the anatomical execution of it, or the splendid manner in which it was got up, reflected the greatest credit on him. It was entitled *Observations on the Structure, Economy, and Diseases of the Foot of the Horse, and on the Principles and Practice of Shoeing*, in 2 vol. quarto. Nevertheless, as though a fatality was to attend the college products, the principles of this elegant work also are considered as lamentably erroneous; and the practice it recommended lamed half the horses it was tried upon (See Shoeing among the Operations). It was likewise proposed, that a *volume of Transactions* should be published annually, exhibiting some striking cases of College Practice, or some indubitable proofs of improvement: and accordingly, in 1801, the first number appeared. But whether

nothing has since occurred to merit note, or whether the modesty of the learned professor prevents him from obtruding on the public an account of his additional discoveries, I am at a loss to state: but the *College Transactions* have been no more heard of; *Parturiunt Montes*, &c. &c. It remains to state, that Mr. Sewell, a distant relative, I believe, of Mr. Coleman, became his assistant some years ago, and is lately styled Sub-Professor; but whether the appellation is an official or an assumed one, I am unaware. Report speaks of this gentleman as an excellent practical veterinarian.

I have thus given the history of this establishment to the present time; but whether the effects produced on the art it was designed to promote are commensurate with what might have reasonably been expected, it may be worth considering *. The public opinion is, I believe, generally not favourable towards the *actual* benefits derived; but that opinion is still an advocate for the presumptive benefits that may be drawn from it. Should this criterion be considered as liable to fallacy, the most fastidious will allow that a fair one may be drawn from the productions of the college members. Since its establishment, some hundreds of pupils have received diplomas from it, constituting them veterinary surgeons, sanctioned and qualified to act as accredited members of that body. Yet of this number (and young men are all willing to write) not more than three or four have produced any thing on the subject that will outlive their practice. Of those who have written what has hardly been read, we have instances but too numerous, for either their own credit or the reputation of the college.

If, therefore, the diffusion of practical veterinary knowledge is not equal to what was expected from the known abilities of the professor, the immense encouragement he has received as an individual, and the support the college has met with as a body, to what are we to attribute the defect? Various causes, perhaps, operate; but the two principal ones appear to me, First, that the energies of the professor are wrongly directed; next, that his avocations are too numerous. It would appear invidious, perhaps, to enter on the first cause; the second is sufficiently notorious. The extensive calls on his time as *Veterinary Surgeon General*, are alone fully sufficient for any one individual. The requisite attendance to the *Ordnance department*,

* In the following examination of the present state of the Veterinary College, I am solely actuated by the cause of truth, and an anxiety for the welfare of the art I profess. This anxiety I fully evinced in the former edition of this work, by affording Mr. Coleman and the college the utmost of my humble support. I then rather wrote what I hoped, than what I knew. Much time has since elapsed, sufficient for the fulfilment of my wishes, had the conducting of the concern proved equal to the importance of its object. My present opinion on the state of this institution, and on the degree of improvement it has brought about in the art, was not hastily formed, and is the same I gave before a committee of the House of Commons, appointed to examine me on the subject. What I then stated appeared to make a considerable impression, and the necessity of some alteration was, I believe, generally admitted. But, like many other evils and abuses, detected and acknowledged at that time, this has remained unaltered.

and at Woolwich in the same capacity, but which is totally distinct from the army in general, would occupy another. A considerable *private practice* might be considered sufficient for a third. And I believe that I need not insist that the *lecturing, operating, dissecting, and attending to an extensive infirmary at home*, with the entire arranging and conducting so extensive a concern but yet in its infancy, might, at least, engage the attention of any one person, however indefatigable himself, or well assisted by those around him. How then engagements, that would be fully sufficient for the energies of at least four persons, can be performed by one, unless some are ill performed, and some totally neglected, it would not be easy to point out. From the above statement I conceive it is, therefore, clear, that this important art can never receive the improvements it is capable of, until its professor is stripped of those clogs on his time that so much divide his attention. If the present emoluments of the numerous situations Mr. C. holds, amount, as they are reported to do, to more than £3000 per annum, the situations themselves might, with great propriety, be divided among three or four others, leaving an ample provision for each, infinitely benefiting the country at large, and the veterinary art in particular. Without, however, inquiring further what the present Veterinary College is; it may yet be proper to state, what any schools of this description ought to be. In an art but yet in its infancy, and in a school where its *clèves* come to it in general with almost every thing to learn, it is evident that its superior instructor should be never absent, at least during the hours of business and instruction. The professor should be one who felt a hearty interest in the concern, not merely as it formed the road to the accumulation of money, the increase of patronage and power, or the gratification of vanity and pride; but he should consider himself as placed at the head of a most important and valuable institution, to cherish its rising branches; and the various improvements he might be enabled to make, should be *given* to that public from which he derives his support; not *sold* with a niggardly view to himself alone. His regard for the advancement of the art should be also shewn, by a ready disposition to countenance genius and merit in this particular line, wherever he met with it. An enlarged mind would dictate to such a person, that all knowledge might not concentrate within the college walls: nor need he ever fear that any portion of his sun might be eclipsed by a feebler ray. As an instructor, he should be easy of access to his pupils, conciliating, and always ready to afford instruction. Between the scholar and the pupil, if the distance is increased by arrogance and haughtiness, no wonder if disgust makes many stop short of improvement. The public lectures should be given with extreme regularity, as they are in the schools for human medicine. There would certainly be no more excuse for irregularity in the one case than the other. These lectures should be comprehensive, demonstrable, and full of facts; and by no means clogged with theory, or bewildered with idle speculations. The pupils should be encouraged to dissect, and these dissections demonstrated to them;

they should also be invited to attend minutely to the practice of the hospital. To this end, the professor, accompanied by the pupils, should go round the infirmary publicly every day, and audibly note every change that has taken place in each complaint, and the treatment that is to be pursued. A daily account of practice should be kept open for the inspection of every pupil. Clinical lectures should also be given on particular cases occurring within the hospital. Emulation should be excited among the pupils by private examinations: but, above all, the various operations in farriery should be practically taught; nor should any pupil be allowed his diploma, until he had not only actually gone through every operation himself, but had shewn a degree of expertness at them in general. This would prevent the possibility of future blunders being committed, equally disgraceful to the scholar and the school. Lastly, when such a course of studies was completed, no favoritism should be suffered to appear at the public examination of the pupils. The whole should be conducted with impartiality, and in no instance should any low vindictive motive operate to the disadvantage of any individual.

Such is the method in which instruction should be conducted in any veterinary college; and it is not too much to say, that, if this is the mode pursued in our London school, we shall eventually reap the benefit of it. I shall conclude, by giving a short outline of the veterinary college of Paris.

The *Ecole Veterinaire* of Paris was instituted in 1764. It is furnished with a cabinet of natural history, and subjects elucidating comparative anatomy. Lectures are delivered daily on the economy and diseases of the horse. The various operations in farriery are practised in the presence of the pupils, *in which every one of a certain standing is obliged to take a part;* and, that the country may never be without a sufficient number of accredited practitioners, each department sends three pupils, and each regiment of cavalry one, who are boarded and instructed at the expense of government.

I shall now proceed with the account of Veterinary Authors.

In 1790, Mr. Prosser, a gentleman engaged in the practice of physic, advertised his intention of practising farriery; and, as a previous step to it, published a *Treatise on the Strangles and Fevers of Horses.* It contains some judicious remarks on other authors, but offers little original matter. Mr. Taplin likewise produced, at various times, other publications, which were exact counterparts of his *Gentleman's Stable Directory.* One of these, remarkable for its neatness of appearance, called *multum in parvo,* appears to have been simply intended as an advertisement of Mr. T.'s infallible *Prepared Horse Medicines;* one specimen is sufficient: he recommends *balls for the inflammatory cholic,* 'which need no collateral aid, but brisk action 'and friction.'

In 1796, appeared a very elegant work in quarto, the production of S. Freeman, Esq., an amateur in the manege, and a gentleman of fortune, learning, and great ingenuity. This publication consisted

of a *Description of the Structure and Economy of the Foot*; accompanied with a set of plates highly finished, in Skelton's best style. The subjects were dissected under the inspection of Mr. Home, or an assistant; and, except some slight errors in the ligaments of the navicular bone, appear very correct. This publication, for the elegance of its engravings, and the general spirit of the whole, will be long admired.

A Mr. John Lawrence, about this time, published a small volume, containing extracts from M. St. Bel, Osmer, Clarke, and Lord Pembroke. In 1798, this gentleman brought forward a *Philosophical and Practical Treatise on Horses*, and on the Moral Duties of Man towards the Brute Creation, in two volumes. The part of this work on the general treatment of the horse is humane and interesting; but when he attempts to treat on farriery, he may be said to lose sight of his object. Indeed, so gross and so numerous are his mistakes, that it might be supposed he had laboured to disseminate error. From his being something of a humorist in his manner of writing, more than from any merit in the performance, the work has passed through a second impression. In the former edition of the Veterinary Outlines, I noticed a few of the principal errors with extreme candour and mildness. But this gentleman, who is so acutely alive in his own feelings, and withal so humane to the brute, has little respect for the pain he may inflict on his fellow creatures; accordingly, in his second edition, his gall is allowed to flow unrestrained, in a manner that does little credit to his head, and less to his heart. I own I paid him at that time much too great a compliment, by even noticing these errors. A fly should not be broke on the wheel.

In 1800, Mr. Morecroft published a small pamphlet entitled a '*Cursory Account of the various Methods of Shoeing Horses, with 'incidental Observations.*' Any remarks on this production would be unnecessary; the ingenuity of the author is well known. The mode of shoeing recommended will be noticed in the course of the work. This year likewise produced a vindication of the present practice of farriers, in a pamphlet by a Mr. Lane. I shall only remark, that if this gentleman was delegated by the body general, they could not have been more unlucky in their champion. It was one thing to retort the abuse cast on them, but it was another to support and vindicate their absurdities.

In 1801, Mr. White, of Exeter, who had been veterinary surgeon to the first regiment of dragoons, gave to the public a small *Vade Mecum of Farriery*. Such was the beginning of a work that has passed through several editions; and now, in 1816, appears in four octavo volumes. The first, is termed a compendium of the veterinary art. The second, comprehends the veterinary materia medica. The third, is a sort of supplementary volume, containing Mr. W.'s experiments and observations on some particular diseases, as glanders, farcy, staggers, &c. The fourth, comprises observations on the dis-

eases of cows, sheep, swine, and dogs; the mode of performing the most important operations in farriery; with *additional* remarks on the epidemic catarrh, and diseases of the eye. It is greatly to be lamented, that this most valuable work is so totally without order or method, that more than one half of its excellence is hidden or lost. Subjects, that ought to be brought into one point of view, are scattered through the various volumes in detached parts, and only finished in an *appendix*. Mr. White, however, appears to me, in the law term, to have travelled out of the record, when he enters on the diseases of other animals; it otherwise would not have been necessary for this ingenious writer to have submitted to gather from such authorities as John Lawrence and Mr. Daniel. Mr. White's first and third volumes will always remain monuments of his industry and observation. His materia medica would have been more worthy of him, had it treated more largely and more practically of essential articles, and less of others that might have been, indeed, altogether omitted. The detail of operations in the fourth volume entitles him to gratitude from the junior practitioner. In the appendix to this volume, he adds some additional account of the hydrophobia, extracted from the pamphlet of Mr. Gilman. Mr. W., I make no doubt, was totally unaware from what source Mr. G. was enabled to make that *minute* account with which he favoured the public; but if Mr. White, or any other person, will be at the trouble of comparing it with the account of rabies, published by me in the fourth edition of the 'Domestic Treatise on Horses and Dogs,' three years before, they will readily detect the source so glaringly and uncandidly drawn from.

The year 1801, likewise, produced a work of considerable elegance from the pen and pencil of Mr. Richard Lawrence, of Birmingham, veterinary surgeon. It is much to be regretted that a gentleman, who appears to possess so much ingenuity, should pass over subjects of such importance in such a light cursory manner. The description and treatment of some diseases occupy fewer lines than (to treat the subject in a manner to prove useful) they would require pages. The plates are elegant, and extremely well designed, particularly those that regard the proportions and paces of the horse; those that regard the internal structure and diseases are not so happy. The diction is very superior, and, as a cabinet work, it is most certainly elegant and interesting; but, as a useful assistant to the art itself, it does not rank so high. It has been since re-edited, and published in an octavo volume, with alterations and improvements.

About this time, also, appeared Mr. Downing's *Description and Treatment of the Diseases of Cattle*. An old writer on the same subject, Topham, appears pretty largely borrowed from by Mr. D. This work is in considerable repute among farmers, graziers, and even some farriers; and it may be regarded as a pretty faithful, though melancholy, picture of this part of the veterinary art, as practised among the greater number of farriers and cowleeches.

In 1803 appeared, in a large volume quarto, by Mr. John Feron, veterinary surgeon to the 13th dragoons, *A New System of Farriery, &c. &c.* This *new system* appears to be, first, a pretty literal copy of M. St. Bel's proportions of a horse; and, secondly, not a very luminous transcript of the college practice. Since which time, Mr. Feron has appeared also in octavo, extending his medical instructions to the treatment of cattle.

About the same time, likewise, was presented to the public Mr. Ryding's *Veterinary Pathology*, in large octavo. This gentleman was also an army veterinarian. It is needless to say more of this production, than that it was usual at this time, with young men from the Veterinary College, to give themselves consequence with their regiment by publishing. But as this was usually done at the commencement, instead of the close, of their practice, so the proposed end was seldom attained.

1805.—If size constituted merit, this year would have been a memorable one for bringing forth a voluminous production in the form of a *Veterinary Dictionary*, from the pen of Mr. Thomas Boardman, veterinary surgeon to the 3d regiment of dragoons; price £3..3s. This expensive and large work is a compilation from all the modern writers; and, if our author had made his selection with as much judgment as industry, it might have been a meritorious production. As it is, it may prove an useful reference on occasion; particularly as it gives fac-similes of most of the plates contained in the various works of merit that have appeared.

This year, also, the indefatigable Mr. John Lawrence published a *General Treatise on Cattle*. The various animals it treats on are principally considered as articles of domestic economy, with a few pages dedicated to their diseases and the treatment. It is altogether a very respectable publication, and may prove entertaining to the amateur, and useful to the farmer and grazier.

In 1806, Mr. Francis Clater, a chemist and druggist, published an octavo volume, entitled *Every Man his own Farrier*. It consisted of the old jargon, a little leavened with the new; the usual number of diseases, and nearly a similar number of never-failing recipes from the old school, somewhat meliorated. And since, with equal claims to merit, has appeared, by the same hand, *Every Man his own Cattle Doctor*.

In 1809, that very ingenious veterinarian, Mr. Bracy Clark, of London, favoured the public with the first part of his *Dissertation on the Foot of the Horse, with Experiments on Shoeing;* and the next year he brought forward the second part of the same. The object of this elaborate and elegant work is, by accurately describing the foot of the horse, to enable the reader to comprehend the hurtful effects that the present system of shoeing, even under the best hands, has upon the foot. It is the author's opinion, that the application of an Iron Shoe by means of nails, as now practised, is the *natural* cause of the alteration that is found to take place in the feet of all horses after shoeing; and which alteration it has been usual to attri-

bute to other causes. This opinion will be further examined when we treat on shoeing. Mr. Clark's dissertation is a prelude to a proposed alteration in the present mode, by bringing forward an invention called the Paratrite, or shoe that may be applied without nails, having instead an elastic steel band embracing the hoof as its means of attachment.

Sect. III.

OF THE PROPER MEANS FOR THE ATTAINMENT OF THE VETERINARY ART.

THE mode in which any art is attained must be, in a great measure, directed by the future views of the learners. It appears to me, that there are three distinct classes of persons who are likely to study this branch of useful knowledge. The first, are persons of fortune, with enlarged minds and extended educations. The second, are surgeons, whose situation in country villages may render their services in this art highly useful, upon occasions when no farrier is at hand, or in cases in which farriers of the common class are unable to judge. The third, are farriers themselves, or persons intending to profess veterinary medicine.

Gentlemen and amateurs, who wish to accumulate information on this curious and interesting subject, within the reach of the Veterinary College, will find their account in attending a course of lectures there; if not, I hope they may gain all they want from the following sheets.

A good surgeon has travelled three-fourths of the road towards making a good veterinarian; but he must diligently travel the remainder to arrive at excellence. He must by no means sit down contented with the analogy between the human and brute, which might otherwise lead him into very great error; for though this analogy is, in some cases, very striking; yet there are others in which the similarity fails, and he is left to act upon different principles. Hence in those diseases that are conquered or mitigated by vomiting in the human, in the horse another mode of treatment must be pursued; and in some acute diseases that are beneficially treated in the human by purgatives, a similar plan would not only fail in the horse, from the length of time necessary to produce the relaxation, but would also prove hurtful if brought about: Pneumonia is one instance of this. It must likewise be remembered, that the operations of medicines are very different in the one and the other, arising principally from the peculiarity in the stomach of the horse. This will evince the necessity for a conversance with such anatomical variations from the human frame, as will naturally lead to variation in the practice also between the one and the other,

of which the feet form a notable instance. The specific diseases, as glanders, farcy, strangles, grease, &c., must also occupy his particular attention; as here all analogy would fail.

The third class of veterinary pupils are farriers already practising, or such as intend to practise, this art exclusively. To such persons it must be evident, that entering themselves at the Veterinary College, even in its present state, is a matter of importance. Not only will they derive benefit from the course of instruction there carried on, and from the numerous opportunities of observing diseases in the infirmary of the institution; but those already practising will become habituated to a different mode of considering the art altogether. In fact, a new field will open to their view.

But when, from circumstances, farriers, or persons intending to practise farriery, cannot possibly attend the Veterinary College, still let them not despair; improvement is yet within their reach: and, provided they will be content to enter on a systematic and regular plan of accumulating information, the acquirement of the art may be made both easy and agreeable. In the first instance, recourse should be had to some elementary work on human anatomy, such as Dr. Hooper's. By reading this attentively, the memory will become habituated to anatomical language, and the mind will be gradually led to wish to form a further acquaintance with the subject. In the next place, the anatomical detail of the present work should be closely studied, and committed to memory; after which, dissection may be proceeded on: any small animal may be first dissected, to enable the learner to use his instruments properly. He may then proceed to dissect the horse with some authorities by him, which will assist him to make out parts; but too scrupulous an attention to numerous descriptions will only bewilder. The necessary instructions for dissection, and the preservation of parts, may be gained by a recourse to Poole's and Parkinson's works, professedly written to instruct the pupil in these particulars. When he is well acquainted with the appearances of the animal in health, he should take every opportunity of examining diseased appearances, which are seldom wanting at the tan-yard or the kennel. He should now make himself acquainted more intimately with physiology, for which purpose he may begin with the light and ingenious publication of Mr. Saumarez, and then proceed with Haller, Cuvier, and finish with Richerand. Pathology, or the doctrine of diseases, may be gained, it is hoped, from the following sheets, assisted by Mr. White's valuable publication. A general acquaintance with human pathology will also greatly assist the veterinarian, for which he may study the popular treatises on this subject, as Hooper, Thomas, Cooper, and others; and his general pursuits may be assisted by a reference to Parkinson's Pupil's Guide.

Sect. IV.

EXTERIOR CONFORMATION OF THE HORSE.

THE horse, in *zoology*, and, according to the Linnæan system, is a distinct genus of animals of the order of *bellua*. The characters of this order are, that the fore-teeth are six in each jaw, the upper, erect and parallel; the lower, more prominent: the canine or dog-teeth are single, placed at a distance from the others, and but little longer than the incisive; the hoof is formed of one piece*.

The natural history of the horse is so interesting, that I might be indulged in the pleasing task of dilating upon it, but that the pages taken up on that subject would be wanting for other purposes. The veterinarian, and inquisitive reader, is therefore referred to Buffon and later writers on the subject. We must content ourselves with briefly remarking, that this noble animal appears to have been originally a native of what is called the old world, and, by industry, to have been planted in the new. It also appears the genus exists naturally in greatest perfection in warm climates: nevertheless, care and attention have improved the breed in climes less congenial, to that degree, that the northern horses now greatly surpass, in excellence, the aborigines; and it is now not uncommon, to send stallions from England to improve the breed in those very countries from whence the original stock of excellence was drawn. Much alteration is brought about by climate and soil, and much by attention to improving the breed. In the arid plains of India the horse is naturally of a moderate size, beautiful, spirited, and very speedy. As he approaches more temperate climes, he enlarges in size, but decreases in beauty: this is, however, compensated by his becoming more hardy, strong, and patient. In countries where pasturage is luxuriant, and the plains extensive, he is found naturally bulky; and from such sources we have been furnished with our grand breed of coach and cart horses, as Belgium, Norway, Sweden, &c. &c.

* 'Animale generosum, superbum; fortissimum in currendo, portando, trahendo, 'aptissimum equitando, cursu furens; sylvis delectatur, posteriora curat, caudâ 'Canopes Tabanosque abigit; alterum scalpit, pullum injuriæ obnoxium reponit; 'hinnitu socium vocat; dormit post noctem; calcitrando pugnat; sudans se volutat; vegetabilia edit bove propius, semina disseminat; stercus incalescit, cystide 'felleâ caret; non vomit; equileus Hyppomane natus, pedibus elongatis; lædítur 'globulo auris, litis, Padi herba, Phellandrii, curculione, conope irritante. Laborat hernia mediastini, polypo cordis, ortopnœâ, œstro bovis, nanasali, hæmorrhoidali scabie, tartaroque pedum, bubone colli; Hyppocomâ instruitur. Edit impune acontum. Utero gerit 290 diebus, placenta non fixa. Lanarios dentes quinto anno acquirit.'—*Systema Naturæ.*

'Le cheval est sans contredit le plus utile des animaux soumis à l'empire de 'l'homme; nous avons pour premier garand de ses grandes qualités, l'estime générale 'dans laquelle il a toujours été; cette estime a été portée anciennement à un degré 'si haut, qu'on a accordé à un Dieu puissant du Paganisme.'—*Le Parfait Maréchal.*

'Fudit equum magno tellus percussa tridenti.'—*Virgil. Georgic.* lib. i.

The horses of the British Islands were originally a small ill-shaped kind, few exceeding fourteen hands and a half in height. In the more mountainous districts, as Wales and Scotland, they were even less; but they were hardy and very sure footed. Those situated at the most northern points were still smaller, and covered with a great quantity of thick long hair to defend them against the severities of the weather.

At what precise time horses were first brought into Britain is uncertain; but it must have been at a very early one, since history informs us they were sufficiently numerous, and their uses well known, when Julius Cæsar invaded the island: probably we were originally furnished from Gaul. The first change wrought on them arose, probably, from a melioration of the soil by agriculture; in which, as their food become more nutritious, they gradually thickened and became more bulky, but were still ill shaped. In Henry the Fourth's time the public attention appears to have been awakened to the necessity of improving the breed of horses; and some public ordonnances were promulgated to that effect. In the reigns of Henry the Seventh and Eighth, it became common to import foreign stallions for this purpose: Barbary and Spain furnished the principal. In the next reigns, others were imported from Belgium, Flanders, and Denmark: and as the former were intended to improve the speed, spirit, and beauty, these latter added greatly to the size of the future breeds. As early as the twelfth and thirteenth centuries there were horse-races in England; but these were probably only ordinary trials of speed between the native animals. In the reign of Henry the Eighth, horses bred from the Barbary breed were trained for the purpose; and it is from this epoch, that we may date the progressive improvement of the horses of England, till they now not only vie with, but excel, all the horses of the world, both in beauty and qualities.

The *exterior conformation of the horse* is a branch of knowledge that very properly precedes a consideration of his internal structure; and the animal, considered generally, may be divided into head, neck, trunk, and extremities: the different parts comprising each of which, have various terms of art in general use appropriated to them; and it has been found, from long experience, that there is a peculiar form for each of these that is best adapted either to the general purposes of the animal, or to the uses we put him to. Nevertheless, it is not possible to reduce this state of perfection to a geometric scale; hence reducing the horse into a square, and giving various admeasurements for the separate parts as a standard, is not found by experience to exemplify the art: on the contrary, it proves fallacious, and leads into erroneous conclusions. Nature will not be limited, and the perfection of her operation is not dependant on exterior symmetry only, but on a harmony and accordance of the whole, internal as well as external. In considering a horse exteriorly, his age, his condition, and other circumstances, should be taken into the consideration; and to determine, with

precision, to what perfection a horse may attain, when he is seen under various imperfections, is, perhaps, the *ne plus ultra* of a Hippopotamist's knowledge. A horse of five years' old, though considered as full grown, yet experiences very considerable alterations in his form between this age and seven or eight. At these latter periods he becomes what is termed furnished; his points all shew themselves. That is, he is in fact more angular, and, in a painter's eye, would be more picturesque, but less beautiful. A horse, likewise, very low in flesh and condition, is not the same animal as one full of flesh and in condition. And, again, the sleek fatness of full and gross feeding, with little exercise, is utterly unlike the robust form acquired from generous diet with correspondent exertion.

The *head* is a very important part, considered with a view to the beauty of the animal; and in no part is an improvement in the breed so soon detected as in this. Can any thing be conceived more dissimilar than the small inexpressive features attached to the enormous head of a cart horse, compared with the bold striking ones that grace the same part in the blood horse? It is probable, that the heads of the native horses of Britain were all large and heavy till the introduction of the eastern blood. The head, in the improved breed, became small and angular, the eyes prominent, the ears spirited, small, and pointed; the forehead, wide, straight, and sometimes slightly curved inwards at the lower part, and in them the facial angle is about 25°, whereas, in the heavy breed, it is more generally 23°; its junction with the neck also is less easy and elegant than in the improved kind.

A superficial observer might, perhaps, overlook the extreme beauty in the head of the horse, and particularly the great fire and expression of his countenance, when animated by any leading passion: and this is to be the more admired, when it is considered how few aids this part has in the brute, compared with the human. Man borrows much of his facial expression from his eyebrows, and, when to these the varied action of the mouth is added, it amounts to more than a half of the total expression. Upon studying the Greek and Roman models, one is led to form but an unfavourable opinion of their horses, from the heavy inelegant heads that are presented to us in their studies and pictures. Either they despised the lighter and more animated breeds from Egypt and India, or their artists too often studied imaginary heads, compounded from the human and brute countenances; and this really appears to be the case, from the sunken eyes, overhanging eyebrows, contracted nostrils, and lips thick and generally wide apart, observed in their statues and pictures.

The *ears* are usually supposed criterions of the spirit of the animal, and I have seldom seen a horse who carried one ear forward, and the other backward, during his exercise, especially if on a journey, but what was lasting and good. The reason appears a plain one; a horse of spirit, strong, and not easily fatigued, is at-

tentive to every thing around him, and directs one ear forward and one ear backward to collect sound from every quarter. I need not mention, that the ears are an indication of the temper of the animal; and that he is seldom either playful or vicious, but the ears are laid flat on the neck. It was kind in Providence to give us such a warning in an animal who does not want craft to surprise us, nor strength to render his resentment terrible.

The *eyes* should be very particularly attended to in an exterior examination of a horse: the globe should be full and prominent, with a thin surface of eyelid. When the globe is small, or sunk within an orbit surrounded with much fleshy substance, such eyes are found more prone to inflammation than the former. It is prudent, however, to guard against too great a convexity of the eye, which now and then does actually exist, and renders the horse shortsighted. The eyes should always be examined in the shade: no better situation can be chosen than that the horse's head should be pointed outwards, but his eyes remain half a foot within a stable door. The cornea, or transparent part of the eye, should be perfectly clear throughout its whole extent of surface. Sometimes it appears so on a slight inspection, but, more attentively examined, opaque milky lines may be traced crossing its surface. In other cases, nearly the whole may be clear except the extreme limits, which shall be surrounded with a milky opaque line: when such appearances exist, it betokens the remains of former inflammation, and a great danger of recurrence; though it may be proper to notice, that an accident, such as the stroke of a whip, may leave a milky speck or line, and that such eye may be no more liable to inflame than though the injury had not taken place; but then very clear evidence ought to be obtained that an accident had really occasioned the blemish, and which blemish also will seldom be found at the circumference. Not only must this exterior glassy covering of the eye be examined, but the attention should be likewise directed to the deeper parts within the sight, the appearance of which, in a moderate light, should be perfectly transparent. In a strong light it should exhibit a lively blueishness; but if, in a moderate light, it appears turbid or milky, there is latent mischief, and the examination should now be still more minute: the eye should be viewed in every direction, and it is more than probable that a speck or line of white, more conspicuous than the rest, will appear; in which case a cataract has already begun to form (see *Eyes* in *Splanchnology*). In other instances, again, though the parts within the sight may not appear opaque or milky, yet they may exhibit a glassy greenishness, which also is a proof of the existence of a most destructive affection, called, by the farriers, glass eyes; but, properly, *gutta serena*. The existence of this may be proved by observing whether the iris, or the curtain forming the pupil, contracts and dilates; that is, when the hand is placed over a sound eye for a little time, the iris will dilate so as to increase the size of the pupil to admit more rays; but, on the removal of the hand, will again contract and lessen the

pupil, to exclude them. A blind horse likewise usually carries his ears as though alarmed, in quick changes of direction, and hangs back on his bridle or halter, lifting his legs up very high; in fact, presents every indication that a person blindfolded would do. Immediate inflammation of the eyes, is known by the appearance of tears running down the face, and an impatience of light. When the iris, or moving curtain that immediately surrounds the pupil or opening into the eye, is of a lighter colour than brown, such horses are said to be *wall eyed;* but, however it may detract from beauty, it no farther affects the eye. The general colour of this part should be hazel, or dark brown. In some horses, the transparent cornea is small in its circumference, in which case the opaque cornea must necessarily be large, and shew much of the white of the eye. It is necessary to distinguish such instances from others, in which, though the opaque cornea, or white, shall be of its natural dimensions, yet, from the greater contraction and dilatation of the eyelid, more of it is seen. In the former, it is evident that the white of the eye shewing itself in a considerable degree merely from a small superficies of transparent cornea, is the simple form of the organ, and can have nothing to do with the temper: but, in the latter instance, a large appearance of white may be received as an indication of a vicious disposition; for extraordinary motions of either the eyes or ears, and which are generally synchronous, are consequences of the wants and passions of the animal. If a horse is suspicious, he generally looks out for opportunities to revenge former injuries, or to repel new ones; and the retroverted direction of the eye, in which, of course, much of the white is seen, is merely intended to guide the blow he meditates.

The *face* comprehends the part between and below the eyes; when there is much white in it, it is considered as a blemish. If the white extends down the face, it is termed a blaze; and, when continued into the muzzle, it is called blaze and snip. If only a spot of white appears in the forehead, it is called a star, and is esteemed a beauty. If, with a star, white begins below, and is carried downwards, it is called race; and, as has been beforementioned, if it is continued into the muzzle, it is called snip. Thus, when a stolen horse is described, these distinctions become useful; and, in regimental accounts of the marks of horses, they are particularly attended to. Such a particular horse is said to have star, race, and snip white, while another has a blaze only.

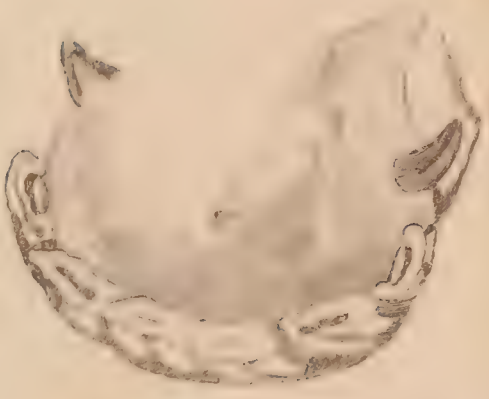
All the lower part of the head, including the nostrils and lips, is called the *muzzle.* The darker the colour of this part, the more is the horse esteemed. Very dark brown horses are, however, an exception to this, for, in them, the muzzle is generally of a tan colour, which is highly esteemed.

The *lips* themselves should be thin and well supported; when hanging loose and pendulous, it bespeaks age, sluggishness, or debility; and it is of more consequence than is usually supposed, that their commissure, or the opening of the mouth, should be of

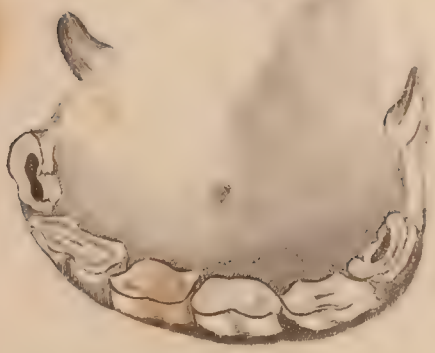
Colts Teeth.

5 Years.

6 Yrs



7 Yrs



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sufficient extent. If too small, it is unfavourable to beauty; but what is worse, it is inconvenient for the well placing the bridle.

The *mouth* itself is a subject of importance, as upon the various appearances of the teeth we form a criterion of the age. The *bars* also are essential to the proper obedience of the horse, and are those ridges in the posterior jaw, between the tush on each side and the grinders. Like the beard, the bars should neither be too fleshy, nor too lean, too round, nor too sharp. If by a rude hand they have been scarred, the feeling from the bridle can never be true.

OF THE TEETH, AS CHARACTERISING THE AGE; WITH THE AUXILIARY MARKS.

A COLT is usually foaled with six grinders in each jaw, three on each side.

In ten or twelve days he puts out two nippers in front, above and below.

In a fortnight after, the two middle ones appear; and in two or three months from this, the corner nippers are pushed out.

From this, till he is a year old, no great changes take place, except that the cavity in the nippers begins slightly to fill up, and appears worn, and the neck of each tooth is particularly distinct. He has likewise now four grinders on each side above and below, three of the milk set, and one permanent.

At a year and a half, the cavity in the nippers is nearly filled up, and he has now three milk and two permanent grinders in each jaw, above and below.

At two years, the mark in the nippers is wholly effaced, and they appear like the same teeth in an eight year old horse: at this time, likewise, the first milk grinder above and below falls.

At about two years and a half old, the two front nippers fall out; and as the permanent ones are some little time coming to perfection, a colt may experience some difficulty in grazing: it might be proper, therefore, at those times, to give him some cut food.

Between the third and fourth year, usually about three and a half, the two next nippers appear above and below, and the second milk grinder disappears about the same time, leaving him now six molar teeth on each side above and below, one colt's, and five of the permanent set.

About four and a half, the two corner nippers fall out, to give place to the last set. The last milk grinder likewise does the same, and soon after the tushes appear. From this time he is no longer called a *colt*, but a *horse:* and if it is a female, on the falling of the corner nippers, she drops the name of *filly*, and assumes that of *mare*. It is about this time a horse is supposed becoming useful, arriving at his strength, and being capable of enduring some fatigue; and as, till this period, he is objected to for the purposes of utility, so it becomes a matter of study with dealers possessing colts, to make them appear older than they really are. It is, there-

fore, very common for them in a promising well-grown colt, less than four years old, to draw out the corner milk teeth, on which the horse teeth below appear soon after; the reasons for which we have before explained: they likewise, at the same time, cut the bars to produce the tushes; and when such a colt is docked and nicked, it is not easy to detect the deception: but if to an examination of the usual appearances is added an observance of the grinders, the imposition may be discovered; neither can the animal gain the true appearance of the age they wish, unless the front nippers appear filling, and the corner ones are nearly equal with the rest. The deception is also rendered conspicuous when this is the case, by the animal not being sufficiently *furnished*, as it is termed; that is, by his not having lost his colt-ish form, or his muscles having become swelled and furnished by exercise. A four year old horse is leggy, his forehand is thick and low, his feet are round and very wide at the bottom, his muzzle is round, and his mouth has no depth.

At five and a half, in a natural state, the internal wall of the corner nippers is on a level with the rest, and the tushes are completely come out, which now present a pointed body curved inward, with the outer surface round and smooth, but the inner surface concave and grooved. (See *Plate* II.)

At six years old, in general cases, the black mark or cavity in the two front lower nippers, which was before wearing, now becomes completely effaced.

At seven, the same mark or cavity in the two next, or intermediate teeth of the posterior jaw, likewise is completely worn out, and the tushes appear something blunted.

At eight, the cavity in the lower corner teeth is lost, and now a horse is said to be aged, and to have lost his mark. But these cavities in the upper nippers are found to disappear more slowly; and at eight, when the whole of the others have become effaced, it is common to find only the two front upper ones filled. The late professor of the Veterinary College, Monsieur St. Bel, was the first who introduced here the mode of judging of the age after this period by the upper teeth, which he gained from the riding-houses in France, where this mode is much depended on. He taught, that two years elapsed between the disappearance of each of the next pairs; that is, that as the front upper nippers were found filled up at eight, the two next were filled at ten, and the two upper corner lost their mark when the animal was twelve. But though the cavity in these teeth disappears, something like the above, they do not do it with sufficient regularity to be altogether depended upon; nor should a veterinarian ever give a decided opinion from this alone, as he may subject himself to much mortification.

At ten years, therefore, in a great number of instances, the two intermediate upper nippers will be found filled up: the tushes become very blunt, and lose their internal concavity, and the fleshy ridges of the roof of the mouth become leaner.

At twelve, where the disappearance of the upper cavities is regular,

those in the corner are effaced, and the tushes are now only a rounded button; the fleshy ridges are still less evident, and the nippers now begin to push forward in an horizontal direction.

When a horse lives to fifteen, his incisive teeth become nearly triangular, and still more horizontal, the upper projecting over the lower, and the upper corner tooth frequently becoming sawed, as it were, into two parts. They now appear yellow, and frequently the grinders become irregular: the eyes likewise sink, and the pits over them look deep. As the animal advances in age, all these appearances strengthen. The nippers flatten at the sides, separate from each other, become furred, and have furrows on their surface; grey hair appears over the eyes, the anus projects, while the cellular membrane surrounding it is absorbed; the lips become thin and pendant, the lower being often nearly paralytic. But as horses are evidently, for many years after they have lost the mark, as it is termed, active, hardy, and fitted for every exertion; so, when a dealer becomes possessed of a horse whose teeth bear more actual marks of age than either his limbs or spirit, it is an object worthy his attention to give them a more youthful appearance. The principal part of this art consists in the operation called *bishopping;* which is the making an artificial cavity in the upper surface of the nippers, by means of a sharp hard tool, and then burning the cavity black with a heated pointed instrument: but the strokes of the graver detect the imposition, and the two inner grooves of the tushes cannot be restored by similar means; nor can its blunt point be again made sharp and prominent. The tush, therefore, should always be attended to in examining the teeth for a horse's age. It is, indeed, in many respects, a more certain criterion than the nippers, and is among judges more attended to than them.

The judgment formed from the teeth, though general, is liable to error, as some horses living wholly on grain, and early worked, must necessarily wear theirs more than others feeding principally on succulent matter. In cribbiters, and those who champ much on the bit, this variation may be very considerable, and make not less than two years' difference between them and others. A too strict adherence to the teeth marks, very frequently leads those who are only moderate judges into very great error, by causing them to reject the most useful and valuable horse without these marks, as being supposed past his work. Nothing is more fallacious than this; the commonly received marks of the age, grant a criterion of not a third of the natural life of the animal; nor of one half of the time in which he is perfectly useful, and fully capable of answering all the purposes for which he was intended: and it is only in a country like our own, where these generous animals are so early put to labour, and so unremittingly forced to pursue it, that this mark is so much attended to. A subordinate attention should be paid to the appearance of the teeth, if a horse appears what is termed fresh and sound; that is, if all his organs are capable of their several functions, the limbs being firm, and exhibiting no appearance

of too early, too great, or long continued exertion. The early ruin of English horses is not only to be attributed to the excellence of the roads, by which persons are induced to ride hard; but it is principally to be laid to the account of their being too soon worked, before the maturity of the system is complete, or the motive organs completely evolved. By the premature exertion taking place before parts are well capable of bearing it, early weakness is produced, and nature takes artificial means of strengthening the debilitated organs; hence the cavities between the tendons and their sheaths are destroyed; parts take on a bony structure, whose original formation was cartilaginous, as the lateral cartilages of the feet, and the articular processes of the vertebræ, and a greater quantity of bone is deposited on the surface of some bones than is natural, forming splents, spavins, ring-bones, &c.: and to counteract the unnatural waste, other secretions are likewise preternaturally augmented, producing, in the mucous capsules, windgalls, blood-spavins, &c. But where horses are suffered to attain their full growth, and the complete evolution of their stamina, if they are afterwards put to full exercise, not altogether inordinate, they become competent to the exertions expected of them, and reach old age sound and vigorous. Many good judges will not purchase a horse for hunting earlier than eight years old, and regard him only in his prime at ten or twelve. It is but little considered that the period of a horse's life, with moderate care and good usage, is protracted to twenty-five, thirty-five, and forty-five years: and an instance lately occurred of a horse dying at fifty. The instances of their being vigorous and strong at thirty, and thirty-five, are very numerous; and nearly as frequent as activity in men of eighty and ninety. A gentleman at Dulwich, near London, has three monuments of three horses, who severally died in his possession at the ages of thirty-five, thirty-seven, and thirty-nine. The oldest, it is to be remarked, was in a carriage the very day he died, strong and vigorous; but was carried off in a few hours by spasmodic colic, to which he was subject. At Chesham, in Buckinghamshire, there was a horse of thirty-six years old, who exhibited no symptoms of debility, nor any external signs of age, but being nearly covered with warts. It was remarkable, with regard to this four-footed Nestor, that when an unusual hard day's work was required, he was always chosen, as never failing in what was expected from him.

Mr. Culley, in his *Observations on Live Stock*, mentions a horse he knew, who lived to forty-seven years, having during that time a ball in his neck, received in the battle of Preston, in the rebellion of 1715; and which was extracted at his death, which happened in 1758: and, judging him at four years at the time he received the wound (and it is probable he was more), he must, at his death, have been forty-seven.

These, it is true, are not very common instances, but it is not the natural economy of the animal makes them so; but his early application to full exertion, and the unremitting continuance of

this, whereby his race is begun frequently before he is three, in the brake, lunge, or riding-house; before five, his utmost speed is exerted after the hounds in winter, and as a hackney against time in the summer; at seven, blind, foundered, and spavined, he gallantly shines in the mail or stage; at eight, he faulters in the fish cart; and, before ten, worn out with disease and inanition, his reputed old age gains him an honourable exit at the slaughter-house.

Hence it must be at once evident how small a proportion of a horse's *natural* life is eight years; and yet this is the period that the majority of persons begin to consider him as aged, and unfit for service. The more I see of horses, the more I am astonished at the want of attention and consideration this evinces: my long acquaintance with the animal has induced me to draw the following comparison between the ages of man and the horse; that is, at these several periods of comparison, the constitution of the man and horse may be considered as in an equal degree of perfection or decay, according as youth or age preponderate. Thus, the first five years of a horse, may be considered as equivalent to the first twenty years of a man; that is, that a horse of five years, may be comparatively considered as old as a man of twenty; a horse of ten years, as a man of forty; a horse of fifteen, as a man of fifty; a horse of twenty, as a man of sixty; of twenty-five, as a man of seventy; of thirty, as a man of eighty; and of thirty-five, as a man of ninety.

Oxen and *sheep* have their ages observed by their horns, which are more conveniently examined, and more certain in their appearances than their teeth. Oxen have a *permanent* and *temporaneous set* of *horns*. Sheep have only the permanent set.

In neat cattle, the age is sufficiently indicated by the general appearance till the third year, when the temporaneous horns fall, and are replaced by a permanent pair. These appear with a kind of button at the end; and as each succeeding year's growth protrudes this knobbed extremity from the head, a circle or ring round the horn is formed; consequently, in these animals, if three years are reckoned for the button at the extremity, and an additional year for every circle, we shall gain the age of the beast; though it is not unusual to scrape or rasp down these rings, to deceive the unwary. In those kine who have no horns, the general appearances are considered, with the whiteness and equality of the teeth, which in the aged are uneven, yellow, and sometimes black. Neat cattle have incisive teeth only in the posterior jaw: there was no necessity for anterior nippers in them, for they gather long grass principally, which they wrap into a tuft with their tongues, and, applying it to the under or posterior jaw, cut it off with the under teeth. They change their temporaneous set earlier than the horse, beginning at two years to renew the front nippers, and getting a pair every year till they are five years old: thus, having eight nippers at this time, when they are called *full mouthed*.

Sheep have their age indicated by the horns and teeth. The horns in those who have them, are more usually examined: these do not change, but, as each succeeding year presents a ring, one

year is counted for the point, and an additional year for every one of these rings. Where they have no horns, the teeth are attended to. At twelve months, a lamb puts out his new front nippers; and every succeeding year, he gains two more, till he is four years old, when he then has eight in his lower jaw, his upper, like the ox, being deprived of them. The age of *goats* may be ascertained in the same way; and in *deer* it is told by an additional branch appearing to the palm in the antlers or horns.

EXTERIOR CONFORMATION OF THE HORSE.

[Continued from p. 29.]

The *channel*, among horsemen, is that hollow that is formed between the two branches of the posterior jaw; internally it lodges the tongue, more exteriorly are placed glands, vessels, and fat. It should not be too wide, or the head appears ill set; but, on the contrary, if it is too narrow, it becomes a still greater defect, both in the riding and the carriage horse; for in this case it will be impossible for the horse to bend his head inwards, or to reign to the bridle, either in riding or driving. This part should therefore be particularly attended to in the examination of a horse for purchase.

The *neck* should form from the head to the withers an elegant but moderate curve: its under surface should be nearly straight, which, in ill bred horses, is often arched outwards. In point of length, it is of consequence that the neck be duly proportioned: if too long, the head will be too weighty. The long neck, likewise, seldom presents a firm or proper resistance against the pressure of the bit. When, on the contrary, the neck is too short, the head is frequently ill placed, and the lever in the hand of the rider will be also too short. Such necks are often likewise weighty, and overloaden with flesh. When the upper surface of the neck is thick and heavy, it is a very strong presumption of a sluggish disposition, particularly in geldings and mares. In stallions, it is a *distinctive sexual* mark, and hence less to be depended on. Now and then, the neck is arched downwards, which is called ewe-necked. When the deformity is considerable, it prevents the head from being carried in its true angle; instead of which, the nose, from being projected upwards and forwards, has occasioned such horses to be called star-gazers; to remedy which, it is necessary to draw down the head by a martingale. In the horse, and all the grazing tribes, the bulk of the head is in an inverse proportion to the length of the neck, otherwise the muscles would not be able to lift it; and the length of the neck is such, that, added to the angle resulting from the head, the length of both is equal to the height of the shoulders from the ground. It may not also be amiss to mention, that, in the purchasing a horse, it is prudent to observe whether the upper part of the neck bears any marks of a tight collar having been worn. When such an appearance does exist, it commonly arises either from a strap worn to prevent the action of cribbiting, or such a horse is apt to unloose himself, which is almost an equal defect.

The *mane* is that long hair that crowns the neck throughout its whole extent; that part of it immediately in front of the head is

called the foretop. Nature appears to have designed this part simply for beauty to the animal: had it been for a guard to the neck, it would have grown on both sides; whereas, when not altered by art, as in dragoon horses, it hangs naturally to one side only. In stallions, the mane is generally very thick and long: a white one, exhibited some years ago, had it some yards in length, and which was carried in a bag. It is usual to thin the mane and tail by wrapping a tuft of the hair around the fingers, and pulling it out by the roots: but this mode prevents its laying well, and disposes some horses to resist. In my own stable, I have found that the frequent use of a three-pronged angular iron was the best means of keeping the hair thin, and assisting it to lay well.

The *trunk* comprises various parts. The *withers* are formed from the long transverse processes of the dorsal vertebræ; and as their use is to serve as levers to muscles, so their length must be of great advantage; hence, horses with high withers usually go much above the ground; that is, the muscles of the back acting to greater advantage, the fore parts are more elevated during progression; and this may serve to shew riding masters, that a horse, going above his ground, does not depend altogether upon the motion of the shoulders, nor on the height to which he lifts his legs; but likewise upon the extent to which his general forehand is carried by the action of the dorsal muscles. When that is well up, as it is termed, it gives greater room and play for the other parts to be moved through a larger space; for a horse, it is evident, can describe a greater portion of a circle in the time of a considerable elevation than in that of a small one; and as his fore legs describe a segment of a small circle, while his withers describe a portion of a larger, and as these may be considered as proportional, so it follows, the higher the withers are carried, the greater extent there will be for the legs to act in, and a longer time for a higher elevation. But it is evident this only applies to such horses as are wanted for particular purposes: in the cart horse, whose weighty forehand is of great service, as he draws by an effort to preserve himself from the tendency to the centre of gravity; so the more he is loaden before, and the nearer he approximates this centre, the more advantageously he applies his powers. Nor is it supposed essential to the race-horse; indeed, most animals designed for speed in the gallop, which is but a succession of leaps, have their foreparts low. There are horses, particularly of the Dutch kind, who are remarkable for going with their foreparts up, though their withers are not high; but this is done in them, from the great strength of the muscles of the haunches and croup, and the inclination of the hinder extremities to approach the common centre of gravity of the whole body; and hence the tendency of the fore extremities is relieved: horses, therefore, who are weighty before, might be made useful, and prevented from stumbling, by a good rider. In such, the tendency towards the ground should be obviated by the rider's placing his

weight backward; hence, in race-horses, where the reverse of this is wished, the saddle is placed forwards.

But the above remarks must not be supposed to detract from the importance of the functions of the shoulders; on the contrary, on their just proportion and proper situation, in a great measure, depend the perfection of the animal progression.

The *shoulders* are those parts that extend from the withers on each side, obliquely to the point, in front of the counter or chest, and which is called the point of the arm or shoulder, but is wholly formed of the bone of the arm. In horses designed for extensive action, either in trotting, galloping, or walking, they should be muscular, but not overloaden with flesh. If too lean, they want strength; if too heavy, they impede the motion. But it is too frequent, that persons mistake a muscular for an overloaden shoulder: if the shoulders and withers have not sufficient extent of muscle, the horse can have but little extent of power before. The shoulders are not connected, as with us, by means of an intermediate joint; but as animals have no collar-bone, so the connexion is wholly muscular, and by this means is rendered elastic, which it would not otherwise be; hence riding on the croup of a horse, where the union is bony throughout, is very unpleasant and uneasy. When the body is propelled forward, its tendency to the centre of gravity is counteracted by the fore extremities, which then receive the mass: had the shoulders, therefore, possessed a bony connexion, the machine at this time would have experienced a shock; but as it is, the strong muscles of these parts receive and sustain what the hind quarters have thrown on them, till the angles of the hind legs have been alternately contracted and extended, to repropel the mass, while the dorsal muscles suspend the foreparts. The centre of action in the shoulder is within its own middle, and the motion it enjoys is confined to the perpendicular backwards, and to as great an elevation as the muscles will admit of forwards. Thus, it is evident, the more oblique its situation, the greater number of degrees it can run through, and hence be more extensive in its motions. It is the custom with some persons to put horses early to plough, to throw their shoulders backwards; but whether the obliquity is increased by this means is questionable. And when they are too much loaden, it is the practice, with others, to sweat them, by keeping them warmly clothed across the shoulders, whereby it is supposed they become finer.

It appears probable, that the hind and foreparts do not bear an equal proportion of the propelling force in all horses alike; hence we now and then find speedy and good movers where the shoulders are not well placed: but in such cases the formation is always perfect behind. In blood horses, the shoulders are generally deep, though the withers are not always high; and in them the fore limbs are often short in proportion to the hinder: for as speed appears to be a principal end in their formation, so, as the gallop is but a succes-

sion of leaps, comparative anatomy shews us that this action is principally brought about by the flexion and extension of the angles resulting from the hinder extremities; the fore limbs receiving the superincumbent mass, while the muscles of the hinder parts are preparing for a fresh spring. Nevertheless, the shoulders still operate materially, and perhaps in a greater degree, in the slower paces of the short gallop, the trot, and the walk.

The extent of a moving part is, in the first place, produced from its length; hence a long and deep shoulder is ever preferable to a short one. In the second place, the extent of motive power is also dependant on its direction; thus it is that an oblique shoulder is notoriously favourable to power of support, and to speed in progression. In a still more eminent degree, it favours that proper elevation of the united fore limb, that constitutes safety in action. For, as the angles formed between the shoulder, the arm, and the fore arm, are consentaneous, and make a kind of bony arch when in action; so an oblique and deep shoulder is generally accompanied with a full bending of the knee. The converse of this form is common with mares, who, from a decreased obliquity in the shoulders, have the angle regulated by an increased obliquity in the whole limb downward; or, as is familiarly expressed, they stand with their legs under them. The immediate reason of this apparent defect is, that, by such a position of their fore extremities, the pelvis is raised higher; by which additional height of the hind parts, the foal becomes more conveniently placed, and less likely to be ejected. Few rules can be laid down for observance in the exterior conformation of the horse, that are of so general application, as that a short and upright shoulder, particularly if united, as it usually is, with an inclined direction of the whole limb backward, is a sure mark of an unsafe goer, and commonly, though not so universally, of a slow one also.

The part between the points of the arms, or shoulders, is called the *breast* or *counter*. It should be wide and extended; when narrow, the horse is seldom powerful or durable, though he may be speedy; the lungs have not sufficient room for expansion, nor the muscles sufficient extent of attachment: such horses have usually weak shoulders, and the fore extremities being too near each other, render them less firm than they should be. The breast may, however, be too wide; and particularly when the parts in front are very prominent, from whence arises too great a weight in the foreparts, which though desirable in a draught horse, would be very little to be wished in a hackney.

The part opposed to the point of the shoulder or arm, is termed the *elbow*. The width of this part, and its forming a considerable angle with the arm, is a matter of the utmost consequence; for, as it is a lever for the extensor muscles of the fore arm, so its length must make all the difference in power between a long and a short purchase: any one the least acquainted with mechanics must be aware how great this is. The elbow should stand on a level with the arm, laterally; when it is turned inward, it confines the action considerably; when it is too much turned outwards, the toes are

often turned inward. The space between the point of the shoulder and the elbow, is, properly, the arm; though it is not usually, among horsemen, considered as such; originating from a want of consideration of the internal structure. It should be placed in the line backwards, as the shoulder is forwards, and the more acute the angle between these parts the better; for the greater will be the extent and strength of the motion described by the opening of this angle. The *fore arm*, which is usually called the arm, should be large, particularly in its width, shewing strong marked powerful muscles; for in every instance a small fore arm is a certain indication of weakness. All animals intended for quick motion have this part long; the knee in the greyhound is but three or four inches from the ground; but though this part should be long for quick progression, it is not equally eligible for the cadences of the manege, and hence horses of this description are chosen with a short fore arm.

The joint immediately below this, which in the human forms the wrist, is, in the horse, termed the *knee*. All the joints of a horse ought to be broad and extended, whereby the surface of contact is increased, and the stability, in proportion, augmented; they present likewise, by this means, a broader surface for the attachment of muscles, and remove their insertion farther from the centre of motion, thereby increasing their power. The knee should be examined to see whether the skin has been broken by falls, and great caution is necessary in this, for it sometimes grows so well up as hardly to be discernible; frequently, also, the dealers use some colouring matter, whereby the part is rendered black: but it does not follow that a mark or scar always indicates a stumbler; and persons are too apt to forget, that the best horse may have an accident and fall, which will never influence his future manner of going, unless the cicatrix should be of such extent as to interfere with the motion of the joint: if, therefore, the arm and fore arm are strong, the forehand high, and the horse shews good action, he should not be rejected wholly for an accidental blemish.

The *canon* or *shank* is the part below the knee, and it is highly requisite this part should be well formed, that is, thin and broad; for as it is purely bony and tendinous, so any increase in size laterally must only arise from cellular substance, or some swelling, which will interfere with the motion without adding to the strength. There is within the knee, and at the superior part of the canon, a bone of the carpus purposely set out at a distance from the rest, for the insertion of a muscle; and likewise for the supporting of ligaments that bind down the tendons or back sinews: when this is set wide out, the muscles bending the parts below are situated more advantageously for action, and the back sinews are likewise not bound too closely, but are removed considerably from the centre of their motion, whereby their powers are much increased: and this is so certain, that a horse tied in under the knee, as it is called, is never found to be able to bear exertion long: he soon becomes strained, and the legs get bowed or arched, and totter on the slightest exertion. Dealers

frequently assert that such a horse was foaled so: it is true the colt was born badly formed, but the effects come on afterwards. This also may be considered as a rule admitting of few exceptions; that hardly one horse in fifty reaches eight years old with straight legs and sound pasterns, who is tied in, as it is termed, under the knee. The large powerful tendons supporting and moving the parts below the knee, are called, by horsemen, the back sinews. It is necessary, for the above reasons, that they should be set out wide from the bone, not only at the knee, but continued down, making a broad wide surface laterally. They should also be large and firm, In blood horses this form is particularly observed; on the contrary, in the cart horse these tendons are seldom proportionally large, and as seldom so well placed. These tendons should be distinct and clear from the knee to the fetlock; when any thickening is observed, some injury has been received. If the swelling appears nearer to the bone than the tendon, particularly if on the inner side, it betokens a splent. If this is situated not far from the knee, and is evidently distinct from the tendons, it frequently occasions no future inconvenience; but when a splent appears to extend itself inwards and backwards among the back sinews, it irritates these parts, occasions inflammation, and ends in an enlarged callous swelling. When the whole tendon or back sinew is swelled, and rounded, as it were, into one mass with the bone, leaving no distinctive marks between the bone and sinew, still greater mischief, probably, has at some time happened. Either some of the ligaments have become ruptured; or such a relaxation has taken place from strain, as will always keep the limb weak. To detect lesser enlargements of the tendons and ligaments, the eye alone should not be trusted, particularly in hairy-legged horses; but the hand should be deliberately passed down the shank before and behind. The inner and under surface of the knee should also be examined in purchasing a horse. If an enlargement or a scar appears, it arises from the speedy cut, so called from its being a blow given to the part by the foot of the opposite side when the horse is trotting fast. A sore scabby eruption within the bend of the knee sometimes exists, particularly in cart, or low bred fleshy horses. These eruptive appearances are called mallenders, and render the horse very objectionable, as they prove frequently obstinate against healing, and always bespeak a bad habit.

The next part below the canon or shank is the *pastern* or *fetlock*. General usage, however, applies the term fetlock to the joint itself, and pastern to the plalange or part proceeding from the fetlock to the foot: properly speaking, the fetlock is only the posterior part of the joint of the pastern, from which grows the footlock of hair. It is of great consequence in the exterior conformation, that this part should be duly proportioned. When the pastern is very short and upright, the limb is deprived of much of its elasticity, and such horses prove uneasy goers: they are also unsafe; for the pastern being so nearly in an upright position, requires but a small resistance, or slight shock, to bring it forwards beyond the perpendi-

cular, in which case the weight of the machine increases the prone tendency, and the animal falls. Nor are these the only evils occasioned: this formation tends also to an early wearing out of the legs; for the ends of the bones being opposed to each other in nearly a straight line, receive such a jar or shock at each progressive movement, as gradually deranges the part, producing an overshot joint, and thickening of the ligaments. When, on the contrary, the pasterns are too long, they are frequently too oblique, and must then be also proportionally weak; though, from the increased elasticity occasioned by this formation, such horses are commonly pleasant and easy goers.

These joints, both before and behind, are subject to what are very erroneously termed *windgalls;* but which are nothing more than a diseased enlargement of the mucous bags placed towards the bottom of the shank, between the bone and back sinew, for the purpose of lubricating the joint. Their existence is detected by the appearance in this part of a puffy elastic swelling of greater or less size, and commonly existing, one on the inner, and one on the outer side of the joint. The swelling itself is not detrimental, unless it be very large; but its existence shews that the limb has suffered an extraordinary degree of exertion, the inflammation brought on by which, has so increased, these otherwise natural and necessary parts. The inner part of the fore and hind fetlock is also subject to the accident called *cutting*, which is nothing more than a blow given either by the hoof or the shoe, when, in its elevation, it passes the opposite fetlock. A cutting horse, who lifts his legs very high, does not touch the fetlock; but, as we have before noticed, he strikes the canon immediately under the knee. Cutting in the fetlocks is often a defect in the form of the limbs, as when they stand too near together, or when the feet turn either inwards or outwards. It is also frequently brought on by weakness; hence lean, jaded, and tired horses, will do it at times, who, under other circumstances, will go free and not interfere. For the same reasons, many horses cut before they become strong and furnish, that never cut afterwards.

The *feet* are next to be considered, and, in the conformation of a horse, too much attention cannot be paid to them. We shall here point what is immediately necessary to our present purpose: much more may be seen relative to their structure, when treating on the anatomy of the part. The feet are more liable to be found too small than too large; though, in horses bred in low marshy situations, as Lincolnshire and Cambridgeshire, the feet are often naturally of a larger size than ordinary; and, however convenient this may prove to the animal while moving on the quaggy surface of these marshy districts, they prove very unfit for speedy and light movements in more dry situations. Such horses go heavily, and stumble; and as the horn, of which these enormous feet are formed, is always weak, so, by use on hard roads, the anterior or front part falls in, and the sole or under part projects outward, reducing this part, at last,

from a concave to a convex surface: such feet are then called pumiced.

Horses are, in general, born with their feet perfect; but some breeds are more liable to the grand and frequent evil of contraction than others: it is peculiarly the case with blood horses. Colour also seems to have some influence in contracting the feet; hence I have observed dark chesnuts particularly prone to it. A good foot should exhibit a proper line of obliquity: when the horn is very upright, however wide and open the heels, such feet soon become defective. This is but seldom attended to, even among those who esteem themselves judges: but no rule admits of fewer exceptions, than that such a foot soon becomes faulty. There should also be a proper height of horn; when too high, it disposes to contraction; when too low, the heels, quarters, and soles, are all weak, and a tenderness in going must be experienced. But, above all, the heels should be attended to; they should be wide, and the frog healthy, firm, yet pliable and elastic. There is a peculiar state of disease, not mentioned in authors, or rather it is the beginning of a disease, in which there is a diminished secretion of horn. It shews itself not by any contraction of the heels; on the contrary, these are in general fuller than natural, are rounded upwards, and particularly soft to the feel and shining to the eye: in such cases the frog also is large and softer than natural. *Contraction* of the feet is their most general evil, and it begins generally at the heels; when therefore the heels are narrower than the quarters, particularly if the quarters are indented under the coronet, all is not right. Such a foot will probably feel hotter than natural; the frog also will be compressed and small, and very likely thrushy. Thrushes are always strong objections to a horse; for when they exist in an open foot, that foot will not long remain so, if they are not stopped; and as some horses have a strong natural tendency to thrushes, so their existence is always suspicious, and deteriorates much from the value of a horse. Nevertheless, when it can be ascertained with certainty that they are not of long standing; when the matter only exudes from the middle cleft of the frog, and not from any lateral sinuses, the form or firmness of the frog neither being altered; and also when circumstances can be learned that prove the horse has been placed in such situations as favour the approach of thrushes, as moist litter, or long confinement; then such a horse need not be rejected, for these thrushes may be permanently healed. But when the complaint accompanies a foot already smaller than natural, when the heels are, as it is termed, wired and drawn in, the frog rotten and pinched, and the whole circumference of the hoof perhaps encircled with rings; reject such a horse, let him go as he will, for he cannot long remain sound. When a horse's foot is held up, the sole should present a concave surface; if it is less concave than natural, that sole is weak, and will not bear much pressure; and it is more than probable it will continue lessening in concavity till it becomes a plane, when every subsequent shoeing will endanger the laming of the animal. *White feet* are very objectionable on this account, for they are particularly liable

to become flat in the sole; their quarters also are commonly weak, and fall in; and when neither of these evils take place, they yet have seldom strength enough to resist contraction: and it may be determined on, that when there are three dark, and one white foot, in nineteen instances out of twenty, the white foot becomes defective sooner than the dark ones. *Corns* are another evil to which horses feet are very liable; and unless the shoes are removed during the examination, it is not easy to detect them: though when the foot is well picked out, if a corn has been of long standing, some marks of former cuttings out will appear under the heel of the shoe. Another very serious complaint is a brittleness of hoof; but which may be generally detected by the marks of the fragile parts detaching themselves from every old nail hole. This kind of foot, particularly in hot weather, breaks away, till there is no room for the nails to hold; when the horse, of course, becomes useless.

In an examination of the foot, the eye should also be directed to the wearing of the shoe; if it is unequally worn, particularly if the toe is worn down, such a horse is probably a stumbler, and cannot step true, either from defective feet, or natural gait. In the circumference of the walls of the hoof, sometimes cracks are observed: when these are longitudinal and deep, they are called *sand cracks*. Any such crack should be well examined, and if it occurs in a hoof apparently contracted, it ought more closely to occupy the attention. In fact, unless very strong reasons operate to the contrary, any crack at all resembling a sand crack should cause such horse to be peremptorily rejected. This evil having once occurred, is very liable again to return.

On a review of the conformation of the fore extremities, it may be remarked, that though the hinder ones appear to be more particularly concerned in the quickness of the progression; yet, that upon a proper form and a true direction of the various component parts of the fore limbs must depend the stability, the truth, and the safety of the movements. Viewed anteriorly, the legs should stand rather widest at the upper part, inclining a little inwards as they proceed downwards. When the breast is too large, and the shoulders are overloaded with flesh, the fore legs may stand much too wide; in which case the horse will feel heavy on the hand, commonly go unsafe, and seldom prove fast in any of his paces. But on the contrary, when the legs are too near, particularly if the shoulders are thin and weak, he cannot prove very strong or durable. Viewed laterally, it is of the utmost importance that the fore legs should stand in a direct line downwards, neither forwards nor backwards; the toe should naturally place itself under the point of the shoulder. If the foot should stand beyond this, which is seldom the case, the action will be confined, as the limb will have already passed over a part of its ground. Such a horse, however, generally treads flat, even, and safe. When the foot stands behind the direct line, the defect is more considerable; for inasmuch as it removes the centre of gravity too much forward, so it inclines the animal to fall; and as it is, in ge-

neral, the consequence of a want of extent and obliquity in the shoulder, so it lessens the speed; unless, as has been before said, the hinder extremities should be particularly strong, in which case, though the speed may not be materially affected, yet still the safety of the action may. Some of the best runners this country ever produced, have been very defective in the formation of their fore limbs. Eclipse was a strong instance; but in him, as well as in all the others, there existed a very particular degree of perfection in the hinder ones. To be speedy, therefore, it would appear to be absolutely necessary that the hind quarters should be strong and well placed. To have truth, ease, and safety, in progression, it is also as absolutely necessary that the fore quarters should have strength and perfection of form.

Having finished the fore extremities, we shall now proceed with the body, and first, with that part usually called the *carcase*, which consists of the ribs, the belly, and flank. Anteriorly, the *ribs* should be wide upwards, and as much deepened below as possible, affording what is technically termed great depth in the girth. This form is of great consequence, as it increases the surface of attachment of muscles, and very materially assists respiration. Posteriorly, the ribs should form the body as much as possible into a circular figure, that being of all others the most extended, and the best surface for absorption; thus barrelled horses are greatly preferred. When the chest is too straight and flat, the *belly* is also small; hence neither can the blood absorb its vital principle from the air, nor the lacteals the chyliferous juice from the intestines in sufficient quantities; therefore these horses are weak and seldom durable. As less nutriment is taken up by the constitution, so less is eaten; thus also they seldom are good feeders; and as the pressure on the intestines must be considerable from the small containing surface, so are they usually what is termed washy, that is, easily purged, whereby an additional cause of weakness exists, from the too early passing off of the food. Nevertheless, it must be remarked, that these sort of horses sometimes prove better workers than one would expect, and are commonly spirited and lively. A knowledge of the advantages gained by size in the belly, is what constituted Mr. Bakewell's grand secret in the breeding of cattle; he always bred from such as would be most likely to produce this form, well knowing no other would fatten so advantageously.

The *back*. Where the withers end, the back begins. It should not be too long, for a cylinder of a certain length will not be so strong as one of a less length, nor can it bear so much; hence long backed horses are easy, because the action and re-action are considerable, and thus resemble a spring; but what they gain in ease they lose in strength; the ligaments are longer, and the muscles are longer, and hence act to greater disadvantage. When the back is too short, such horses, by having their extremities too much approximated, usually overreach. The back may be curved inwards or outwards; when inwards, it is termed hollow, or saddle backed, and

which formation is not favourable to strength; but as the counterpoise is kept up by other curves, so the crest is generally good, they ride pleasantly, and commonly carry considerable carcase; sometimes indeed too much. But when the curve is outwards, the horse is said to be roach-backed, which, if considerable, produces the following objections: He will have no liberty in his action, will be uneasy in his paces, and, from the approximation of his hinder extremities, he will commonly overreach. To counteract also the curve of the back, in these cases, not only are the hinder extremities drawn under the animal, but the head, for the same reason, is also carried low. A short backed horse is in considerable request with many persons; but when the back is too short, there is seldom great speed, for the hind legs cannot be brought sufficiently under the body to propel the mass forwards: the points likewise between the ilium and the lower angle of the femur approximate too much, and in their flexion press too much on the abdominal viscera to allow free motion.

The *loins* occupy the attention of all good judges in their consideration of a horse; the back extends to the posterior part of a common sized saddle, and where the back ends the loins begin. Sometimes, from a defect in the sacral processes of the vertebræ, this junction of back and loins presents an indentation, as though the union was incomplete. This may be considered in some degree as a defect, inasmuch as it deprives the part of muscular attachment, and such horses are said to be badly loined. The strength of the loins depends on the extent of the transverse processes of the lumbar vertebræ, which should be long, that there may be an extensive surface for the attachment of the muscles of the back; and these muscles should also be large and prominent on each side, making the loins wide, and seeming to swallow the back bone. When the protuberances of the ilium are very prominent, the horse is called ragged hipped, which operates to the disadvantage only in appearance. From the loins to the setting on of the tail, the line should be long and very slightly rounded; by which means also, the distance between the hip and the point of the buttock will be considerable. This formation is peculiar to the improved or blood breed, and in every point of view appears the most perfect; for it affords a very increased surface for the attachment of the powerful muscles of these parts. And though the large buttocks of the cart horse would at first sight bespeak superior strength; yet, when he comes to be viewed attentively, it will be found that the early rounding of the sacral line or croup, the low setting on of the tail, and the small space between the hip and buttock, produce a decreased extent of surface, compared with the broad croup, wide haunches, and deep spread thighs of the blood horse.

That the hinder extremities are very principally concerned in progression, at least as far as regards speed, is again evident from the attention that nature pays to make them particularly strong, and well formed, in the most perfect of the specimens she has favoured

us with; for let an animal destined for speed be ever so lightly framed in other respects, yet great power will be always displayed in the hind parts. Thus, in blood horses, which are derived from the eastern or most perfect breed we are acquainted with, not only are the loins wide, and the croup long; but, viewed from behind, these horses will be found wider in the thighs than even in the hips: and of all the distinctive marks between the high bred and the low bred horse, this is the most striking and characteristic. A good judge, under every disadvantage, immediately discovers a portion of breeding by this appearance of extent and power in the muscles of the thigh alone.

The *flank* is the space between the ribs and the haunches: this part should not be too extensive, or it indicates weakness in the loins, and too great length in the back. If it is hollow, it shews shortness in the transverse processes of the lumbar vertebræ, and hence a want of room for the large muscles of the loins. When the flank rises and falls in respiration quicker than ordinary, particularly if the horse is at rest, it betokens either present fever, or defective lungs. When it arises from present fever, other symptoms will also be present, as heat, dulness, and disinclination to feed: but when the horse appears otherwise in health, yet heaves at the flanks more than natural, particularly if the weather is moderate, and the stable not hot; it is probable that such a horse is thick winded. If the inspiration of the air appears to be performed readily, but the expiration with difficulty, and the flank, in expelling it, falls with double quickness, and as it were at two efforts, such a horse is broken winded; and his cough, which should then be tried, will be hollow and sonorous. If no quickness in respiration appears, but on trotting or galloping a wheezing noise is heard, this is called roaring; and though it constitutes no present disease, yet it is the remains of a former affection, and even now interferes with speedy action, and, in law, renders a horse unsound.

The *whirl bone*, among jockies, is the articulation of the thigh bone with the pelvis, and is a very strong joint rarely dislocated, but its ligaments are frequently extended; when the horse is said to be lame in the whirl bone or hip joint: and as the powers of renovation are small in these parts, so the lameness is usually long, and the muscles waste.

The *stifle* is the part that approaches the flanks in action, and corresponds to the knee of the human; consequently the part below it ought to be called the leg, but it is usually known by the name of the *thigh* or gascoin. For the reasons before mentioned, it should be strong and muscular; it should likewise make a considerable angle with the femur or thigh, forming a direct line under the hip or haunch. Its length, as is seen in all animals destined for much speed, should be considerable; and all that part below the stifle to the hock, which is called improperly the thigh, should be very large and strong; whenever it is thin, and poorly furnished with muscles, that horse is weak.

The *hock* forms the joint between the thigh, commonly so called,

and the canon; and is the most complex and important joint of the body: it should be broad and wide; for in proportion as the calcaneum, which is the bone that forms the real heel, and is called the point of the hock, extends further from the other bones, thereby increasing the breadth of the joint; so the tendons inserted into it act with a longer lever, and thus with a great increase of power. This joint is subject to several diseases; all of them very hurtful to the animal, and hence carefully to be guarded against. When, on inspecting the hock, a soft puffy swelling is discovered within the ply or bend, it is termed a blood spavin; but is, in fact, nothing more than a windgall, or enlargement of the mucous capsules of the joint, which lie under the vein of this part. What was said of windgalls in the fore legs applies also to these. The mucous capsules on each side of the hock also, at times, become enlarged, and are then called thoroughpin. At the back part likewise of the joint, the ligaments become sometimes strained and inflamed; and the shank, instead of a straight line from the point of the hock downwards, presents in this case a curved surface, with heat and tenderness, which is then called a curb, and produces lameness. The inner part of the joint at the bend is subject also to a similar scabby eruption to that of the fore legs; and which in the hinder ones is called sellenders. But the most serious disease to which the hock is liable, arises from an inflammation of the ligaments of the tarsal bones, and at last of the bones themselves, generally of the inner side, which receives the name of spavin, or bone spavin. To detect the existence of this affection, the hocks should be attentively viewed from behind, when any enlargement in the spavin place may be easily detected: and, in fact, the importance of this joint renders a very minute examination of it essential in every point of view in the purchase of a horse.

In the consideration of the parts below, what has been said of the fore extremities applies equally to the hinder.

COLOUR OF HORSES.

The *colour* of horses does not depend on their real skin, as with us, but upon an exterior beautiful covering which nature has kindly given them, called hair. Nevertheless, the hair is, in some measure, influenced by the skin, as light skinned horses have light hair, and where there is white hair there are usually light eyes. As this hair presents very considerable varieties in its tints, so horses are said to be of various colours. Buffon has classed these into simple colours extending all over the body; into compound, being those mixed with others; and into strange and extraordinary colours. The *simple colours* are the white, the dun, the sorrel, the bay and the black. The *compound* are the grey, the mouse, the roan, and red roan. The *extraordinary* are the tiger, the piebald, the strawberry, and the flea-bitten. Buffon seems to think that bay is the natural colour of European horses, and that, in a complete state of nature, all would be bay; but this has been supposed rather fanciful, though it is probable much might be urged in its favour.

The bay has different shades; and hence forms the bright bay, the dark bay, the dappled bay, and the light and dark chesnut. The brown bay is a large mixture of black, and is usually esteemed excellent. The dark bays have commonly black manes and tails, and likewise black legs and hoofs, and are very justly preferred. The light chesnuts are thought to be, on the average number, rather weak; many of them are, however, very excellent: the Suffolk punches, a most valuable set of draught horses, are of this colour.

The dark chesnuts are fiery in their dispositions, and, I think, particularly subject to contracted feet.

The black, which is not an esteemed colour among us, admits of different shades. Black horses present all the characters, from the most fiery and impatient to the most sluggish and dull. Many persons affirm that there are more bad black horses than of any other colour, and I am very much of the same opinion.

The dun is a colour that has several varieties; it is sometimes accompanied with a white tail and mane, at others with one darker than the rest of the hair; in some there is a list extending down the back, which is sometimes seen in the bay also.

The sorrel is a species of the chesnut of a lighter red; and this, likewise, admits of varieties.

Of the compound Colours.

The roan is a mixture of red and white; and gives the common roan, the red roan, and the dark roan.

Grey horses admit of several shades, or different proportions of white and black, as dappled grey, silver grey, and iron grey. These horses are much valued on account of their beauty; sometimes a slight tint of bay mixed with the white and black, forms a variety in the grey. Grey horses, like the black, admit of no settled character, but have all the extremes within their range; nevertheless the darker greys are preferred.

Pied horses form the most frequent among those called extraordinary: they consist usually of white and some other colour, placed in different parts distinct from each other, as white and bay, white and chesnut, and white and black. The flea-bitten is a grey or white horse with small bay spots intermixed; when these are very large and have a lighter ground around them, they have been called tiger coloured.

It is found from experience, that the varieties in colour influence, in some degree, the real qualities of the animal; and it may be regarded as a general rule, that dark horses are the best: yet this, like other general rules, admits of exceptions. White haired horses, like white haired persons, are irritable and weak; the hair after a wound is white, because the part is in a state of debility: this preference is more to be observed in the compound colours; and it is particularly remarked, that the extremities, when not of a dark colour, are more disposed to disease than others; hence, white legs are considered as a blemish.

OF THE VARIED FORM OF THE HORSE, ACCORDING TO THE SEVERAL USES TO WHICH HE IS APPLIED.

HAVING thus described the exterior conformation, and considered the various external parts of this noble animal, we will next glance an eye very cursorily towards his separate uses; for according to the purposes to which we apply his powers, so some variations in his form are convenient. The slender beauty of the race horse would make him ill calculated for heavy draft. And the grand lofty carriage horse would make but a poor figure as a light hackney.

For *racing*, we require that the greatest possible quantity of bone, muscle, and sinew, should be got into the smallest possible bulk. Every part in such a horse should be, as it were, condensed, and each organ bear evident marks of capability for quick and continued progression. In addition to great flexibility, and some length, the limbs must be strongly united, and systematically placed: the chest must be deep and capacious, and the hinder extremities particularly, furnished with large muscles, operating on extended open angles.

The *hunter* must have more bulk and greater extent of form, to enable him to carry more weight, and to support it a longer time. In other respects, as almost the same qualities are requisite, so nearly a similar form, but more extended, is necessary. For if it requires that the racer should be very powerfully formed behind, to propel him forward in the gallop; so it is equally necessary that the hunter should be well formed in his loins, and well let down in his thighs; that he may have not only speed in his gallop, but that he may have strength to cover his leaps, particularly when they are extensive and numerous.

But in the *hackney* we look with as much anxiety to his fore parts, as we do to the hinder parts of the racer and hunter; and as in them the fore parts are rather subordinate to the hinder; so in the hackney, on the contrary, the hind parts may be regarded as of less consequence than the fore; for though speed is desirable, yet it is subordinate to safety. The head must be small, well placed, and well carried on a neck of due length: the withers high, the shoulders muscular, but not heavy; and, above all, they should be deep and obliquely placed. The fore legs must be perfect throughout, and stand straight and well from under the horse; and what in the hunter and racer is of less consequence, is here indispensible, that the elbows should be turned well from the body. The feet, also, it is requisite should be perfect, and the whole limbs free from stiffness. The height is not so essential in the hackney as in the two former; indeed, the best size of the hackney is from 14-3 to 15-1: he should also be square set, without being in the least clumsy; and with this form the more breeding he shews, short of full blood, the better.

Coach horses should be nothing more than very large hackneys; and whoever is at the pains to consider the matter attentively will

agree with me; though it is not usual to regard the matter exactly as I have stated it. Horses for two-wheeled carriages should be the same, but something smaller. The former are perfect between 15·3 and 16·1; the latter between 15·1 and 15·2. No horse is so adapted for quick draft as a powerful hackney: why otherwise do we take such pains to lunge and rein up our carriage horses, but to lighten them before? When we again go back to old times, and read advertisements holding out safe and *expeditious* travelling from London to York in *six* days, then we may safely resume the old Flanders breed.

In *cart horses*, or those for heavy draft, a similar improvement has been attempted by lightening them materially; but though when very bulky, they are certainly objectionable, yet I think for this kind of horse, some bulk and weight are essential; for it is certain that these animals draw by this weight as well as by their strength. The cart horse should therefore be collectively, though in different proportions according to his various uses, bulky, square, and muscular; and it is peculiarly desirable that his fore parts should be equal in weight and substance to his hinder.

Sect. V.

THE PACES OF THE HORSE.

HAVING considered the horse in a state of rest, we will now consider him as an animal of motion; which leads to an examination of his natural *paces*: these consist of the *walk*, *trot*, and *gallop*. There are other artificial paces; but which, as they are now wholly in disuse, we shall waste no time in describing.

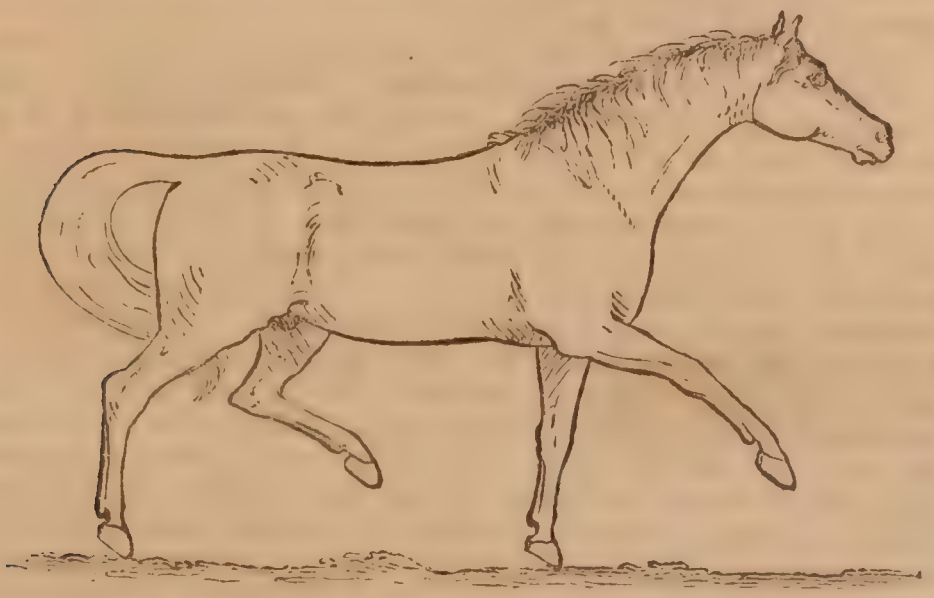
The progressive motion of an animal body is produced by a definite portion of velocity, communicated to the centre of gravity of the moving machine; and which is effected by the extension of the various articulations of the limbs previously in a state of flexion. It has been said, that when the body of an animal attempts a change of position, 'it may be compared to a spring divided into two 'branches, one of which rests upon a resisting body. If these 'branches, after being brought together by external force, are again 'set free, their elasticity will tend to make them recede equally, 'until they form the same angle with each other which they form-'ed before their compression. But the branch which bears against 'the fixed body not being able to overcome its resistance, the move-'ment will wholly take place in the opposite direction, and the 'spring's centre of gravity will be forced from the resisting body 'with more or less velocity.' This appears a simple and correct idea of progressive motion. The flexors of the limb represent the external force that compresses the spring: the extensors correspond to the

elasticity which tends to make the branches fly asunder; and the resistance of the ground represents the obstructing body.

The *walk*.—In walking, one of the hinder legs is first elevated and carried forward. The centre of gravity is by this means displaced, the chest thrown forward, and the fore legs become inclined backward; to relieve which the animal moves the diagonal fore leg. In the next action, the other hind leg follows; the trunk is again thrown forwards over the fore legs; and again, to relieve it, the fore leg that has hitherto been at rest moves forward. This is the most simple account of the walk that can be given; but the simplicity of this pace is by no means so great as may be at first supposed. It is not only completely altered as the animal conducts it slowly or quickly, in which cases it will be either successively or simultaneously conducted; but, like the trot, and the amble or pace, it may be performed either laterally or diagonally. Mr. Richard Lawrence speaks of the walk as a pace wherein one foot only is elevated at a time; but this is correct only when describing a walk of the slowest kind; and even this is at times conducted two different ways. In the one, the legs are laterally and successively in motion; for the near hind leg being first elevated, is set down short of the near fore leg, which is then elevated, and as soon as set down the off hind leg is raised and set down short of the off fore, which then is become raised; and this finishes the round of action. On the contrary, in what may be termed the diagonal slow walk, and which is infinitely the most common, the legs move in the simple manner in which we began the subject. But when the walk is more rapid, its movements are attended with much more complexity. I have laboured to catch the cadences for whole hours, but have seldom satisfied myself. Mr. Freeman, in his elegant and elaborate work on horsemanship, thus describes this walk; and as his ideas on the subject of this pace are perfectly in unison with my own observations, I will use his comprehensive account of the matter. He supposes D to be the near hind and C the near fore leg; B to be the off hind leg, and A to be the off fore; consequently they will stand evenly; thus, $\begin{matrix} D - C \\ B - A \end{matrix}$. This being premised, he proceeds, 'I found that, supposing A the off fore leg to begin, it was immediately succeeded 'by D, the near hind; but B, the off hind leg, seemed not to follow 'the fore leg at the same time as before (i. e. that was in the walk 'of the pace), but this was nothing more than the alteration of the 'poise of the body, when either the one walk or the other took 'place. For when B the off hind leg began, it was succeeded by A 'being lifted up; and when B was set down, D was lifted up. But 'A and B seemed in this walk so connected together by the poise 'being on the same side, that B appeared to begin. The poise 'being altered by the will of the horse, A seemed to begin, and not 'to be succeeded by B, being set down at the same time after it as 'in the walk of the pace. D is in both cases taken up after B is

' set down; and when A is set down, C is taken up, to make room ' for D to be set down.'

In this walk A and D appear to move nearly together; and so in fact they do, when the motion becomes too quick for a walk, although they succeed one another immediately in the walk: for by the poise of the body being across, the trot is immediately produced when required. In most horses, the change of the poise of the body, so as to produce either the walk of the trot or the walk of the pace, can be easily felt after a few steps; although it is too difficult to be caught by the eye at the time of the change.



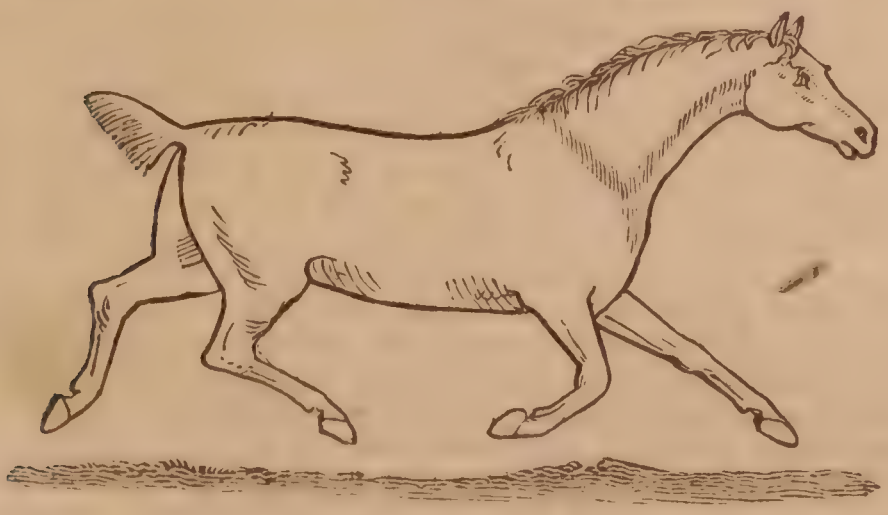
The *Trot.*—This pace, when true, is always performed diagonally, but the limbs are very differently occupied, according as the pace is conducted slower or faster. In the slow trot, the diagonal legs are elevated and replaced simultaneously; while the other diagonal legs remain on the ground, sustaining the weight of the machine, though evidently making ready to take the place of the moving ones; which is exemplified in the above *Fig.* This mode has been given as the true detail of the trot under all its degrees of celerity: but this is very erroneous; for when it is conducted in any degree beyond the slowest, there is a period in every spring of the body, when all the feet are in the air at once *(see Figure,* p. 53). To exemplify this, we will suppose a horse trotting at the rate of nine miles an hour, and we will say that the off fore and the near hind leg have been elevated in the air, and that before they meet the ground, the near fore leg and the off hind leg are prepared to elevate themselves, and actually do so before the others are set down: consequently the feet at this precise time must be all in air, as in the 2d *Figure.* In the above, the near fore and off hind legs are seen preparing to be elevated, while the off fore and near hind legs are yet in action. Now in the slow trot, these raised legs are first set down, before the

near fore and off hind feet are actually elevated. But in the quicker trot they are actually elevated, while the off fore and the near hind are in full progress. At which moment, it is clear the horse is all in air; and this, in fact, forms the essential difference between the slow and the quick trot. The horse having sprung off, and gained a new impulse by the near fore and the off hind legs leaving the ground, they are carried forwards; and while in the air, the off fore and near hind legs meet the ground, and immediately prepare to rebound from it, and to give a fresh impetus to the motion before the near fore and off hind legs again come down; which then forms the second period, when the horse is all in air.

Thus it is evident that, after every impetus or bound, the horse is totally elevated and without support; having no feet at that moment in contact with the ground: on the contrary he is as detached from it as a bird when flying; or, as is more familiar to general comprehension, he is as detached from the ground as when leaping over a space too wide to make what is called a standing leap. If it should not be readily comprehended how the horse should be without support at any time during the trot, let it be considered how running is performed in a man. In walking, one foot meets the ground before the other is totally elevated; and this makes the precise difference between running and walking: for let walking be conducted ever so fast, and running ever so slow, so that the speed shall be greatly in favour of walking; yet these two paces will still remain as different as can be. The precise difference is, that in running, both feet are in the air at one period; for with one leg a bound is made, by which the body is thrown forward, and takes that leg with it; while at the same instant, and while the body is gaining ground, the other leg passes by to meet the ground, as soon as the impetus of the bound from the leg is lost; which having met, it rebounds again, propels the body forwards, and the contrary leg again passes the latter to be ready to receive the weight of the body, and by a new spring again to begin the action. Now exactly the same happens with the horse as with the man; for when trotting, by using his legs diagonally at the same moment, so he, in fact, forms these two into one support; that is, each diagonal support, though formed of two legs, yet as these meet the ground at the same moment, and are simultaneous in their action; so they, in plain truth, become one, and thus make the action correspond with the running of a biped.

Though the trot has not been generally understood, among horse amateurs, as being a pace wherein the feet were all in air at any one period; yet there are many other familiar proofs that put it beyond a doubt, and make it clear to the meanest capacity: one may suffice. It will not be questioned that it is the two contrary or diagonal legs that are in motion at the same time; this is universally known. In any trot beyond the slowest, the near fore leg gives place to the near hind leg; that is, in action, the near hind leg sets itself

down, not *behind* the fore leg, but though it moves in the same line, yet the hinder foot will be found to be set down considerably *beyond* the spot occupied by the fore foot. Now this could not be done unless both were in the air at the same time; that is, unless the near fore foot had been elevated before the near hind foot had been set down. It is unnecessary to carry this further, for it is already understood that the near hind foot being in action, the off fore foot must necessarily be so. [*See the figure.*]



This may, however, be rendered still plainer by considering the action of overreaching or clicking, which occurs in heavy, awkward, or unbroke horses; but particularly where the hind quarters are high, the back short, and the fore quarters low and heavy. In these instances, the balance of power being with the hinder parts, they act quicker; and hence the hind toe is brought to the fore foot before that is altogether ready for it; that is, removed out of its reach: but in the worst cases, it never so far surpasses the fore foot in quickness, as for the hind toe to hit the fore heel; but it always meets the middle of the fore foot at its bottom part, being at the precise time that the foot has commenced its elevation; but which in case the action was perfect it would not do, for the fore foot would then have been completely elevated.

The *Gallop*.—This pace appears to me properly to divide itself into three kinds, in which, though the radical may be the same, yet the mode of performing them is very different. There are the fleet, racing, or gallop of full speed; the slow, or hand gallop, and the canter. It is not usual to consider the canter as otherwise than a slower gallop; but whoever will pay sufficient attention to the subject, will perceive that there are some very essential differences between the two. But I am not disposed to agree with foreign manege masters, who consider all the gallops as distinct paces; on the contrary, I think them all constructed of one and the same action: one proof only may be sufficient; which is, that the horse can

change from either of the gallops into the other without art, and particularly without alteration of his centre of gravity; but merely by an increased or diminished effort of the same action.

The gallop of full speed is the most simple of all the paces; for it is nothing more than a succession of leaps. It is with difficulty commenced with its full celerity at once, the cause of which is evident; for it must require a very great effort to raise the foreparts at once from a state of rest by means of the loins, and to throw them forwards, at the first action, to a distance by means of the haunches and thighs: but the foreparts being raised, the impetus is gradually acquired, till it arrives at its full momentum; in which the foreparts are raised and thrown forward by the flexion and extension of the angles of the hinder parts; and as both of the fore, and both of the hind legs in full speed become opposed to the ground successively at the same moment, that is, the two fore legs at once beat the ground together, and then the two hinder; so it is evident that the gallop of speed is nothing more than a succession of leaps.

The *Hand-gallop*, when acted true, and with the right shoulder forward, may be described thus—At the instant the horse elevates his fore quarters and brings up his fore feet, his off hind leg is thrown a little forward to correspond with the increased forwardness that he gives the right shoulder. I conceive that at this first moment of starting, the horse has three legs only in the air at once, the near leg not moving. The off hind leg only moves enough to gain a true centre, corresponding with the advanced position the animal gives to the right shoulder or leading leg. After this first preparation, the forehand becomes elevated by the muscles of the loins and those of the withers; and as the forehand is raised, the near fore leg comes to the ground first, and the off fore leg doubles over it, and is set down somewhat beyond it. The slower is the gallop, the more considerable I conceive will be the distance between placing the fore legs. As soon as the near fore leg has met the ground, and I believe before the off fore leg has yet been placed, the hinder legs are moved in the following manner: the near hind leg touches the ground first, and as it is reaching the ground, the off hind leg doubles over it and becomes placed also. It is now that the horse begins to be all in air; for on the next spring that the hind quarters make, the fore quarters being already elevated from the last impulse, the animal is therefore completely detached from the ground. The next period when he is likewise so, is when the fore quarters meeting the ground gain an impulse by their rebound, and the haunches are again thrown in to take their share, and likewise to give their impulse.

The *Canter*.—Whereas, in the gallop of speed, the legs are simultaneous, in the canter they are directly the reverse; and whereas in the slow gallop there is still a period in which the legs are all in air, so in the canter it is the reverse also; for, I believe, at no period in this pace is the horse all in air, but has always a point of contact

with the ground; and this I conceive to be the grand and essential difference between the canter and gallop. The canter appears to be conducted thus: When it is performed on the right, the horse commences by first placing his off hind leg a little beyond the other; at nearly the same instant he elevates the forehand, and places first the near fore leg on the ground; the off doubling over and beyond, is placed in an instant after it. In the next movement, the hind legs are thrown in, and while elevated, the off fore leg becomes raised from the ground; but the near fore leg is not elevated till the hinder ones are replaced, and this, as remarked above, constitutes the grand difference between the canter and gallop. I believe this explanation of all the gallops, but particularly of the canter, is novel; but it is the result of close and continued examination of the subject. That there is a very considerable difference between these two latter paces, no one who is in the habit of riding, or who has any sensibility on a horse, can doubt. The sensation to the rider is as different as possible; and so is the action to the eye also. If this is established, it will call to mind that the whole centre of gravity must at one time rest completely on the near fore leg; and that this does take place in the canter is, I conceive, evident from the effects observed: for it is a remarkable fact, though not sufficiently noticed, that all cantering horses have the near fore leg with more of the effects of work apparent on it than the off; and certain it is, that three out of four cantering or ladies' horses, become first lame on the near in preference to the off fore foot and leg. This difference in the wear takes place only in a slight degree in horses who canter but little, but who trot and gallop occasionally; yet even in such cases if the gallop is often made use of, there is generally a superior tendency to wear discoverable in the near or left fore leg; because in leading, as is usual, with the right shoulder forward, in the moderate gallop, the near fore leg meets the ground first; and though as the impulse gained by the rebound elevates the near fore leg along with the off, yet it is not precisely, I conceive, at the same moment that they are elevated; but that the near fore dwells a longer period on the ground, takes an increased portion of weight, and acts as a centre of gravity longer than the off or right fore leg. Judicious horsemen, sensible of this, do not therefore permit their horses always to lead on the same leg, but frequently change, and gallop, canter and trot, sometimes with the right, and sometimes with the left, shoulder forward: for without this precaution, where horses are much accustomed to gallop and canter, the left or near fore leg will inevitably suffer before the right or off fore leg.

Leaping is performed by a sudden extension of all the inferior articulations, immediately after they have undergone an unusual degree of flexion. This extension gives to the bones that compose these articulations, a violent motion, which communicating its impulse to the centre of gravity of the body, it is projected with a determined velocity, which is more or less in opposition to its weight. The projectile force, and consequently the extent of the leap, depends on

the proportional length of the bones and the strength of the muscles: hence becomes apparent, what has been before so strenuously insisted on, which is the necessity that hunters as well as racers should be powerfully formed behind, both with regard to length and strength. Nevertheless, it does not necessarily follow, that a large horse only can take considerable leaps; for, *cæteris paribus*, small animals leap proportionally further than large: for the projectile force impressed on two bodies being in proportion to their different magnitudes, their velocities will be equal, and the extent of the space through which they pass will depend upon their respective velocities. Thus a small horse with a small weight will frequently leap very considerable distances, and to a very considerable height; but from the greater extent of the angles, and the increased force obtained from larger muscles; it is obvious that a certain size is necessary to the hunter, and peremptorily so, if much weight is to be carried.

The direction of a leap depends on the situation of the centre of gravity, with respect to the limbs by which the impulse is given. Man and birds having the trunk situated immediately over the impelling limbs, are the only animals that leap vertically. Hence, when a horse attempts a standing leap of considerable height, as a wall, high gate, &c. he raises himself almost perpendicularly, and the elevation of his body will always be found correspondent to the height of the object.

Sect. VI.

CONDITION OF HORSES.

CONDITION is, properly speaking, nothing more than the appearances that denote perfect or imperfect health. When a horse is in perfect health, he is in perfect *condition;* and, on the contrary, when a horse is in any respect out of health, he is, to speak correctly, out of *condition;* that is, in a *condition* that neither fits him for perfect service to his owner, nor for perfect comfort to himself. But *condition* is used with a latitude of expression exceeding this; and when technically applied, as it usually is, it is more comprehensive but less correct in its signification. Thus a farmer rides a horse to market in full vigour; but, perhaps, from constant exercise, he is not full of flesh, and probably, from being exposed to the air, he may have a very rough coat. This horse, in the general acceptation of the word, would not be said to be in *condition:* and though he may be in a state to do every thing a rider might require, yet, if he passes in this state into the hands of a dealer, he must make some material alterations in the horse before he pronounces him in *condition*, or expects to sell him as such. It would be, therefore, best always to consider *condition* under two distinct views. First, as when it applies to the alteration of the condition of a horse who labours

under any malady; or when it relates merely to that alteration in appearance (supposing a horse in perfect health both before and after the alteration) which makes the animal come up to the standard, or to be pronounced technically in *condition*. *Condition*, in this sense, consists of a sleek coat, a plumpness and fulness of muscle, without much adipose membrane intervening. A horse to be in perfect condition must be lusty, that is, he must have his muscles large; but a horse is never in condition that is loaden with fat. To produce condition in a horse labouring under malady, we must first remove his disease, and which can only be done when we have discovered what the disease is. Various are the affections that will deprive a horse of condition without producing active illness. Affections of the stomach and bowels are among the most frequent causes. There exists a very common stomach affection which shews itself in the following manner. An increased circulation and determination of blood takes place throughout the stomach, and to the whole of the parts connected with its cuticular portion. When this is the case, it produces an increased pulse, some sluggishness of manner, and a mouth either hot and dry, or affected with a viscid mucus: the horse also easily sweats on any exertion. But the most prominent feature in the complaint, or at least the one usually detected, is the enlargement of the rugæ at the roof of the mouth; under which circumstances the horse is said to have the lampas; in which case it is an usual custom to neglect the stomachic affection, and to burn or scarify the mouth to remove the complaint, which is, in fact, attending to the effect instead of the cause. This is a very common state in which horses out of condition will be found; but it has seldom been looked into sufficiently, and never has, I believe, been attended to in the above light. Various are the causes that operate in producing this affection. Young horses are peculiarly liable to it. A plethoric habit, a sudden removal from a low to a full diet, as from grass at once to a full quantity of corn. I have known great and sudden fatigue occasion it. According as one or the other of these causes have produced the defect in the condition, so must the treatment be regulated. But in all cases, when the horse is fat, and of a full habit, bleed moderately, and feed rather sparingly, and every night give the following powder in a mash:—

Tartar Emetic, ...	one drachm
Calomel, ...	ten grains
Nitre, ...	three drachms,

Or the following may be tried,

Crude antimony, Cream of tartar, Nitre,	Of each two or three drachms,

according to the size of the horse.

Upon these, the animal may be exercised, or gently worked, avoiding, however, over-exertion; and if it is found necessary, the mouth itself may be attended to as directed under the head *Lampas*.

In some cases, physic proves useful; and, in others, green meat alone will remove the complaint, particularly when it has been brought on, as is very frequently the case, by little exercise, and overfeeding with oats and beans. When a similar affection exists in an old horse, not fat nor overfed, let him be fed moderately, but whatever corn he gets, let it be mashed, and every morning give him the tonic No. 1, in the *Materia Medica*. A horse may also lose his flesh, and become out of condition, from not being able to masticate his food properly, occasioned by carious or ragged teeth. When, therefore, no apparent cause exists for a defective condition, and the mouth is looked into for lampas, the teeth should be at the same time carefully inspected. This cause is more likely to occur in an old than a young horse.

Cribbiting.—It is certain that some cribbiters will not fatten, and their want of condition has been attributed to the action itself; but I am disposed to think this is erroneous; for I have not observed, that when the action of cribbing has been stopped by means of a strap, that such a horse accumulated flesh. In such cases, it is more prudent to treat it as a stomach affection.—*See Cribbiting*.

Weak bowels.—The lightness of some horses carcase, prevents them retaining their food sufficiently long for perfect digestion; and others have, though differently formed, constitutionally weak bowels, which, upon any exercise beyond the most moderate, become relaxed, and part with their contents. Such horses seldom carry flesh, or bear continued fatigue, and hence cannot be said to be in *condition*. They are best fed on dry food; and their corn, which should be oats and beans mixed, had better be previously bruised. On a journey it will be found advantageous to give such horses gruel or oatmeal mixed in their water; or even oatmeal and ale, if they wholly refuse their food. The *Stomachic*, No. 3, may be also occasionally given to strengthen the stomach and bowels.—*See Materia Medica*.

Worms in the stomach and bowels are a very usual cause of want of condition; and the removal of the worms must be attempted before any hopes can be entertained of restoring the condition perfectly.—*See the disease, Worms*.—In such cases, their existence is detected by the white matter under the tail, a staring coat, a disposition to sweat, and a foul or irregular appetite.

Hidebound.—Under this popular term are comprehended numerous of the chronic diseases of the horse; and I must likewise, in compliance with long established custom, here describe as a disease that which is, in fact, only a symptom of a disease: for being hidebound, is common to many complaints. However, that which I would immediately designate here, may perhaps be considered in some measure as a primary disease, existing principally in the extreme ends of the blood vessels of the skin. If a horse, in a state of perspiration, has it suddenly checked, particularly under circumstances, some of them unknown to us, some more evident; a common one arises, from the horse being in a state of either absolute

or relative debility. Such a horse so circumstanced, and so exposed, is liable to become suddenly out of *condition*: his coat will stare, and feel harsh and dry; being, from the diseased state of the secreting vessels, deprived of its unctuous moistening matter. The interstitial matter also of the cellular membrane of the skin becomes defective; and the hide adheres to the muscular expansion so intimately, that it appears to have wholly lost its usual elasticity. In addition to the simple adherence of the hide, there will also, in some instances, be pustular eruption; or sometimes a mere scurfy appearance, with a falling off of the hair in patches. This has received the name of *surfeit*, and appears the effect also of obstructed perspiration, under particular circumstances. Other causes, however, beside obstructed perspiration, will produce hidebound; but, in such case, other symptoms also will, in general, be present. A slow inflammation of the liver, or of the kidneys, may do it; but in these instances, superadded to the hidebound, there will be a yellowness of the skin. Worms also, as we have before noticed, will produce it, when the appearances then mentioned will readily detect them. Injudicious feeding, and even bad water, may also produce hidebound. But when nothing occurs to mark any known disease, but the simple state of the hair and hide are the predominating appearances; *hidebound* is then, I believe, a disease of the extreme ends of the vessels, the secreting orifices of which become affected, perhaps by the lymph coagulating within them.

The cure of this state of *ill condition* must be conducted according as the subject of the disease is either in a full or emaciated state. If full, bleed moderately, and repeat it at intervals of ten days: give two doses of mercurial physic, and on the intermediate days give the *General Alterative* directed among alteratives in the *Materia Medica*. To this I have sometimes added corrosive sublimate, six grains; in other instances, a scruple of calomel. In cases where the coat has been very unthrifty, harsh, dry, and scurfy, particularly if it falls off in patches, I have received great benefit from dressing the skin universally with flowers of sulphur and oil. As much flower of brimstone may be mixed with oil as will make a mass of the consistence of treacle: with this rub the whole skin well with a brush against the hair. In full fed horses, the quantity of corn should be lowered; indeed, overfeeding, particularly with beans or barley, is a very common cause of the complaint. Spearing the corn proves often singularly useful in these cases. (See *Mashes*, in *Materia Medica*.) This should, in fact, be always done in such instances, when green meat cannot be got.

When hidebound is, on the contrary, accompanied with emaciation, give green meat and the speared corn; but if in winter, substitute carrots for the green meat, avoid bleeding and physic, but give the alterative; and if the complaint proves obstinate, use the sulphur dressing. In the hidebound, both of the full and the emaciated kind, I have sometimes seen the best effects result from

the use of sea water given internally, to the amount of a quart, night and morning.

Moulting also forms one of the most frequent causes of the want of condition. During the spring and autumn, all horses change their coats; at which times the vessels of the skin are in a state of increased action, for the purpose of forming a new growth of hair; and, as such, all the effects of slight fever are present. Horses are then weak, easily sweat, are chilly, suffer from thirst, and are irritable and low. Moulting therefore, more or less, puts every horse out of condition; and in the early part of the hunting season, the inconvenience of this is severely felt. At such times, it is prudent not to dress horses much, particularly with the currycomb, that the old coat may not be too quickly forced off, before the other is grown. Warmth, both in the clothing and in the temperature of the air, is salutary. Plenty of chilled water should also be given; the exercise should be moderate, and the food liberal, but not too heating.

Injudicious feeding is another frequent cause of *bad condition* in horses. When a horse comes from grass, and is at once put on dry food and a full allowance of corn, without any precaution of mashing, &c. &c. he very frequently becomes hidebound, and out of condition; particularly if he is stinted in his water to get up his belly. Musty hay or oats, or oats highly kiln dried, will also often throw horses out of condition; mineral water also will do the same: and I have frequently observed, that horses going to the sea-coast, have returned in an unfavourable state of condition. The hay and corn are often bad near the coast, and the sea air is unfavourable to the coat. Numerous other diseases also, it is evident, deprive a horse of his condition: but these will be treated on under the medical department of the work. What has been described, more immediately relates to the popular term of *condition*.

Getting a Horse into Condition.

When a horse returns from grass, or straw-yard, both his external appearance, and the internal state of his body, in general, require considerable alteration before he can be said to be in such a state, as to make him fit for a horseman's use. These alterations are popularly called, *getting a horse into condition*. It should be first impressed on the recollection, that nothing is more imprudent than at once to take a horse from so moist a food as grass, and place before him hay and corn, without caution or limitation. When he returns from a straw-yard, this caution is not so immediately necessary; yet even in this case, corn should be given at first rather sparingly: but in the removal from grass, both corn and hay should be given with restrictions. The hay, for the first two or three days, should be moistened, by sprinkling it with water: the corn should also be given in very small proportions, mixed with bran, and mashed. Great caution is also necessary with regard to the variation

of temperature. It is highly improper to remove a horse from grass or straw-yard at once into a warm stable; on the contrary, put him at first into a loose box, barn, or other cool open place. If any green meat can be procured, for the first three or four days give him some. If this is not at hand, carrots may be possibly obtained; and, in default of both, let the hay be moistened, as directed, and plenty of water allowed to drink. Sound hay and plenty of chopped carrots, without any corn, make a most admirable food for a horse, who removes from either grass or the straw-yard, for the first fortnight, particularly if he is low in flesh. Bran mashes may also be given alone, so as to keep the body gently open: a moderately relaxed state of bowels, under these circumstances, greatly promotes condition, and prevents the coat setting, or the skin from becoming hidebound. No fear need be entertained, that, by this mode, his flesh will not harden, or his belly be got up. A week or ten days more time may be required by this means, than that usually practised; but the future state of the condition will amply recompense it. It is the hasty change from one state to the other, that produces so many failures in getting a horse into condition, and brings on so many diseases, as hidebound, surfeit, chronic cough, &c. &c. After ten days or a fortnight have elapsed under the prescribed plan, having removed the horse to his usual stable, but keeping it cool, give a mild dose of physic. A very mild one will operate sufficiently, if the bowels have been kept properly open; and in any case, it must be recollected, that very strong purging medicines protract the condition materially.

When this first dose of physic has set, give dry corn daily, and a bran mash every other night only; increase the exercise, which, before this, ought to be but moderate; and now begin to dress the skin with a currycomb, which before has only been whisped and brushed. And as the coat will now probably begin to fall, increase the warmth of the stable but to a moderate temperature only. In a week or ten days from the setting of the first dose of physic, give a second rather stronger; after which, the feeding and exercise may be increased to the full quantity: dressing and trimming may be pursued to the desired end; and, if it is thought necessary, or the horse is intended for hunting or racing, a third dose of physic will finish the process. To the technical groom, and to the professors of the quackery of training, this plan of promoting condition will appear infinitely too simple: but as I wish to teach from principles, so I will venture to affirm, that in a due observance of these simple rules consists all the mystery of training and getting into condition: whatever is added to this, outsteps nature, and generally defeats its own purpose.

Sect. VII.

STABLE MANAGEMENT.

The Stable.

STABLING of horses, as it is wholly a deviation from nature, so it surely paves the way to the attack of many diseases; and we really find that the higher this artificial system is carried, so much the more are the horses, who are the subjects of it, obnoxious to disease. As, therefore, our comforts and convenience have made a life of art necessary to these animals, and thereby rendered them liable to disease, so should our endeavours be turned towards the prevention of those maladies, which a little attention will, in most cases, in a great measure effect.

A *stable* should be airy: in nothing are the horsemen of this country more erroneous. However congenial warmth may be to the constitution of horses, particularly of the blood kind, as being originally natives of a warm climate, it is self-evident that breathing and re-breathing the same air, as is the case in all close stables, must be pernicious; and as being completely removed from what in a state of nature they enjoy, it must be highly productive of disease. The very great difference of the temperature without doors and that within, subjects horses kept so warm to that vast chain of diseases arising from what is termed catching cold. A stable should be only moderately warm, and it should be always ventilated; the ventilation should likewise be as near the top as possible, for the foul air is always uppermost. Where the ceiling is low, and there is no large window, there should be a tube or funnel passing up through the stable ceiling, and through that of the loft above; and this is the most effectual way of ventilating possible: the tube should be funnel-shaped towards the stable, giving, by its bell mouth, a greater freedom to the foul air to pass off. The heat of stables should be regulated by a thermometer, constantly kept in them: 50 or 55 degrees of Fahrenheit is a very good winter heat, and it would be desirable never to have it higher than 65 in summer. A stable should likewise be very light; when it is otherwise, the newly received light the horse gains when he goes out, is a painful stimulus to the eyes, and his imperfect vision makes him start; and, however horses may fatten in dark stables, it must be the fat of a pig, and not the lusty and cheerful gain of a horse, open to the cheering influence of the sun. Stables should be well ceiled, and that very closely: when this is not the case, not only does the dust from the hayloft come down on the horse, and frequently enter his eyes; but, what is as bad and much less thought of, the foul air which is always uppermost, lodges in the hay, which becomes its receptacle, and the hayloft, by this means, proves a source of contagion. In fact, no hayloft, properly, should ever be over a stable;

neither should corn be kept over it: they both imbibe salt acrid particles by this means, and this more particularly if it is not ceiled. Neither is it a wholesome practice for servants to sleep over a stable. As little hay or corn should be kept, likewise, in the stable as possible; but as it is wanted it should be brought to the horses. Narrow stalls are very prejudicial to horses; strains in the back are often occasioned by them; and whenever a stall is less than six feet, the groom should have peremptory orders never to turn a horse in that stall. Bars or bails are also objectionable, from the ease with which horses may play with each other over them: they may likewise kick one another by this means. It is seldom that horses eat alike in point of quickness: when they are separated by bars only, the slowest eater gets robbed of his food.

The acclivity of the generality of stalls is also a very serious objection to them, for they occasion a horse to have a false bearing; the greater weight is thrown on the heels, and the back sinews are put on the stretch; and there is little reason to doubt that many of the lamenesses of horses are attributable to this cause. The ground should be made even, or nearly so, with only a very slight slope. To remedy the inconvenience of the urine not flowing freely off, in many good stables, in the centre of each stall, is a small grating, covering a little well immediately under the horse's belly, to receive the urine, and which is a very good practice; but it has its disadvantages, the principal of which is, that it is not so well adapted to mares; and, as such, a slight slope in the stall, with a grating at its bottom, or a gutter, is the preferable and most convenient plan. Whenever these gratings communicate with one common cesspool, it should be very frequently emptied, and it should likewise be covered up, or it encourages a draught of cold air under the horses.

There is much contrariety of opinion relative to the propriety of permitting horses to stand during the day on litter. There are cogent arguments for and against it. Litter entices horses to lie down during the day, which, if they are in constant severe work, is certainly desirable. Litter, likewise, when the stable is paved roughly, prevents the unevenness of the stones pressing on the feet. On the other hand, horses are very apt to eat the litter, and which proves unwholesome. It is likewise apt to retain the urine, whose acrid salts, ascending, impregnate the air, and stimulate the eyes. The constantly standing on the litter makes many horses' legs swell, which is proved by removing it, when they immediately return to their proper size. Horses standing constantly on the litter appear to feel the difference of the road, and hence are more liable to be tender footed: the warmth and moisture retained, likewise, are very apt to occasion cracks and swelled legs. Those who are advocates for litter under horses during the day, should be very careful to have it changed as often as it is either soiled or wet, for wet litter is one of the strongest causes of blindness. But whoever attends minutely to the subject on an enlarged scale, will be at no loss to determine

on the propriety or impropriety of suffering horses to stand constantly on litter. It is my opinion that this custom alone ruins more horses than all the mails and stage coaches put together. It is the fruitful source of contracted feet, and brings on this ruinous affection much more certainly than the hardest work. Horn has a natural tendency to contract inwards, and towards the heat. The feet, it must be evident, are more hotly placed in litter than on the bare and moist ground, consequently the horn gains this additional stimulus to contraction. The litter keeps them dry as well as hot, and thus one of the best preventives of contraction, which is moisture, is not suffered to come near them. In my own stables no litter is ever suffered to remain under the fore feet during the day. The horses stand on the bare bricks, and which in summer are watered to make them more cool: by which means, I have experienced astonishing benefit. Behind, a little litter is strewed, because they are apt to kick and break the bricks with their hinder feet, and because the litter thus placed sucks up the moisture of the urine, which would be detrimental to the hinder feet, which are more liable to thrushes than contraction.

A horse should always be brought into a stable with his skin nearly of the temperature of the stable. It is not generally known, though certainly the case, that passing from a cold atmosphere into a warm one will give cold, with almost as much certainty as from a warm into a cold situation. But if a horse is brought home very hot, he must not be hung by the bridle at the door till he gets cold; he should be walked till he is cool, but not cold. The feet and legs, in dirty weather, may be washed, and carefully picked; but after which, unless they are rubbed dry, it is better not to wash them at all; and when the time can be spared, it is a safer plan to rub off the loose dirt with a very soft broom, and then to wisp till dry, after which curry or rub off the dust completely. A cool stable, with a proper proportion of clothing, is a great desideratum in stable management, and, if more attended to, would lessen the maladies these valuable animals are liable to. It is a most convenient appendage to a stable, to have a box, or large loose place; or, should the box be distinct from the stable, it will be so much the better. It should be so formed as to be capable of being cooled to nearly the temperature of the external air, or made as warm as may be requisite for some cases of sickness. No projections should be allowed in the walls to hurt the hips in cases of falling from weakness, staggers, &c. It should have a grate and well in the centre, with a general bearing of the flooring to that part. The conveniences resulting from a loose box are innumerable. To a horse fresh from grass, to a sick horse, to a lame one, or to a fatigued one; in either, or all of them, it is of the greatest importance.

Stable Management.—This is a subject of considerable importance; but it is evident that the great variety of matter entering into our work will not admit of all the detail that may be wished. The duties of a groom consist in *feeding, dressing, exercising*, and *at-*

tending to the *feet* of his horses; in addition to which, he has the care of the appointments, as *harness*, *saddles*, *bridles*, &c.; and in this order I shall just touch on these subjects.

Feeding forms the most essential part in the care of horses, and more error is committed on this head, from a want of knowledge of the internal economy of the horse, than is at first imagined. The horse, as an animal intended for speed, is furnished with a very small stomach, but capacious intestines; he therefore should be fed but a little at a time; and as we know that whenever the stomach is empty a great debility pervades the whole frame, and as a small stomach must be frequently empty, so we should frequently feed our horses, giving them but a little at a time. The general food of horses is herbage green or dry, and grain, which is always dry. Green herbage comprises all the various grasses; the dry is commonly of clover and meadow hay; and, among saddle horses, meadow hay is used by far the most frequent. Any kind of grain nourishes a horse, but barley and oats are the most in use, and in South Britain oats are almost exclusively used. To horses under common labour, from sixteen to twenty pounds of sound meadow hay, with from half a peck to three quarters of a peck of old full oats daily, will be fully sufficient: should frost or other circumstances prevent or lessen their exercise to a very small degree of exertion; then even the above quantity may be lessened, and a small proportion of bran substituted for some of the corn: on the other hand, when the exercise is very severe, it may be increased. But when corn and hay became so extravagantly dear, many other substances were then substituted as food for saddle horses, which were before but little used, or confined to draught horses, as straw, chaff, carrots, potatoes, &c. Some persons, when hay is dear and corn cheap, substitute wheaten straw for hay; others mix straw with their hay. But by far the most economical mode for the owner, and the most nutritious for the horse, is the use of chaff, which, when mixed with corn, is called manger feeding: and whenever corn is cheap and hay dear, this manger feeding will be found a most excellent mode of horse keeping. The proportions of this manger food I find most convenient are, one part of hay, two parts of straw, and one part of oats. Of this mixture three, four, five, or six pecks may be given daily, according to the size of the horse and extent of his exertion. It will add very much to the nutriment this mixture affords, if the oats are previously bruised; and, in fact, it is much to be wished that this practice was completely established. It will likewise be peculiarly grateful to the horse, if half the quantity of hay should be of the clover kind, of which horses are very fond. On this food, three horses may be supported at as little expense as two horses can in the usual manner; and for common purposes they are full as well nourished. In the country, potatoes and corn may be mixed; or bran, with potatoes boiled and mashed, forms an economical and nutritious food; and it will agree with all constitutions if a little bean meal is mixed with it. In this manger feeding, a few pounds of hay put into the rack night and morning are sufficient,

and even this is more to satisfy the prejudices of the groom than any necessity of the horses. Carrots form an excellent food for horses, particularly for pursive and thick-winded ones. On carrots, hay, and a small quantity of bean meal, horses may be advantageously kept in times when corn is dear and hay cheap. It is not here meant to insinuate that this mode of feeding will do for hunters, or even for those horses whose riders or drivers are never contented without their animals are going at speed. For these horses, old oats in liberal quantities, with a moderate allowance of hay, is best. Changing the food of horses is found very beneficial to some; others, again, do not thrive well on a change, any change being very apt to scour. In the spring, when horses cannot be turned to grass, it is peculiarly beneficial to soil them; that is, to allow them green food in the stable; but great care is necessary to give it fresh every day, or at farthest each other day. It should never likewise be put together in large quantities, which gives it a disposition to ferment, and turn sour.

Watering of horses is a part of their dieting that is not of trifling import. All horses prefer soft water, and it is infinitely more wholesome. So partial are they to it, that a muddy chalky pond is an irresistible stimulus to every horse. It is not a good custom to warm water generally for horses; but it is a much worse custom to give them water just from a pump or well: and this becomes more pernicious in summer, when well water is, comparatively, colder than in winter, and likewise when a horse is heated by exercise. As some horses drink quicker than others, it is more proper to give them their water in the stable than at a pond, where they often drink immoderately.

The quantity given should be regulated by the exercise and other circumstances. In summer, and when the exercise has been severe, more is necessary. In common cases, a large horse requires rather more than half a pail full, and that three times a day: at night a full pail should be allowed. It is erroneous to suppose that abstinence from water increases the wind or vigour. Horses should never be galloped after drinking; it is the frequent cause of broken wind; nor should horses have much water given before eating: but on a journey, when the animal is very dry, give two quarts; then feed; and when that is done, give the remainder of the quantity intended.

Dressing, or *grooming*.—There are three intentions answered by dressing horses: it cleans them from dust and dirt; it counteracts the artificial state of long continued rest and inactivity they are under by their confinement, which it does by exciting the circulation; and, lastly, it gives a beauty and sleekness to the coat. Grooms usually consider only the latter intention; and, as dressing requires much labour, they naturally resort to such means as produce a sleek smooth coat without the exertion; and this, experience tells them, is best effected by hot stables. It is idleness, in fact, which has been the origin of this deviation from nature; but which, to give it a hold on the good opinion of their masters, grooms assert is intended to add to the health and useful qualities of a horse.

But nothing is so absurd, nothing is so unnatural, and nothing is productive of so many evils to this valuable class of animals, as hot stables. Let the advocates for them live for a month (confined as many hours out of the twenty-four as horses are) in the dressing-room of a warm bath; they may become fine and delicate, but their vigour and durability will be lost. Whenever, therefore, a fine coat is wanted, let it be gained by proper dressing. I shall not here describe the mode used in dressing a horse; it is sufficiently known: but I must make collateral remarks. The dressing *in* the stable should, if possible, be avoided, otherwise the dust gets among the hay and corn, and falls on the other horses, as well as spoils the appointments. The currycomb should not be too sharp; some horses become vicious by the use of one too harsh: in autumn, when the coat is thin, avoid currying altogether. No violent correction should be suffered, nor any unnecessary tickling. The legs should be rubbed by the groom on his knees, having a wisp of straw in both hands, and the leg between the two.

The Feet.—The feet are always an object of particular attention with every prudent horseman, and every careful groom. Every morning the feet should be carefully picked and examined. Observe whether the shoes are fast, what state they are in; whether the clenches are not raised, so as to cut the horse, and that the heels do not press on the foot. Where the feet grow fast, the shoes ought to be removed once in three weeks, whether the shoes are worn or not. A want of attention to this particular is the ruin of many horses; ignorant grooms supposing, that because the shoes are not worn out, the hoof wants no alteration. As well might the ploughman, who puts on a heavy pair of tipped shoes, never cut his toe nails till his shoes want renewing. The moment a foot becomes too high, so soon it begins to contract: in hot weather, particularly if the feet are naturally of a dry hard kind, they should be stopped every night: clay stopping, by getting dry, is not good; cow dung, or even horse dung, is a much better, and is rendered particularly useful if a small quantity of tar is put into it. If the hoofs become brittle, not only stop them, but dress them wholly with the softening mixture directed among stoppings in the *Materia Medica*. Let all the litter be moved from under the fore feet the first thing in the morning; and if the feet should be naturally hard and dry, or tending to contract, then wet the stall; or, what is better, wrap some thick pieces of cloth around the hoof dipped in water. Carefully pick the feet after exercise. Inquire of the smith the convenient time for a horse to be shod: horses sometimes remain many hours in a cold shop, exposed to the tricks or brutality of persons around; but by suiting this operation to the convenience of the smith, it must be attended to immediately. After a long journey, it is a very good plan to pull off the shoes, and turn the horse into a loose place with plenty of litter under him. It recovers the feet very fast; for they suffer, like ourselves, from tender heated feet in summer, or after long exercise, without any real disease existing in them.

The Appointments of the Horse.

In attending to these, some things are essential to the health of the horse, others only so to the appointments themselves. Of the former kind, is the airing of every thing belonging to him thoroughly, and which is more important than may be at first imagined. When a horse comes in hot from a journey, his saddle must have absorbed a large quantity of moisture: without care, this must remain damp; and if put on in this state the next day, will very frequently give cold: the same often happens from the body-clothes, and even from the girths. It is a very proper mode to wear a cloth under the saddle: this can be more easily dried, and never can get hard, with a little care. Horse cloths are certainly necessary, as they keep the animals from draughts of air, and from the access of dust to their coats; but in this, as in the stables, grooms err in point of heat, for their horses are almost always too much clothed. In summer a single sheet is fully sufficient; and in winter, one woollen cloth alone is all that is requisite. Neither hacks nor hunters should have head clothes; and breast clothes, though ornamental, are something more than useless, for they keep a part, while at rest, warm; which, as soon as the horse goes out, is the part that most meets the air, and is most exposed.

EXERCISE.

NOTHING is so convincing a proof of the necessity of exercise to animals as their love of play in a state of nature; from which natural act we likewise infer, that it is much more necessary to the young and to the robust than to the old and weakly: this remark should influence our domestic management of horses, and of dogs likewise.

Horses and dogs live a life of art when they become domesticated; some of them more so than others: a racer and a lady's lap dog are as remote from a natural state as art can make them. Now, as luxury has introduced these refinements, nature, in order to keep pace with them, has introduced numerous diseases, unknown in a state of nature: and as animals thus artificially treated have a constant tendency to fall into disease, it is our duty to counteract it as much as lies in our power.

We confine horses and dogs not only to have them at our immediate call, but to bring them into particular states, which are artificial.

The wind, durability, and emulation of the race-horse are increased by artificial means: the same art is requisite to form the manege horse's cadences, which could not be retained was he permitted constantly to run at grass. The speed, docility, and even scent, of the sporting dog are, in a great measure, acquired by his education and constant practice.

Nature is always equal to her wants, but is never lavish of her gifts. Horses in a state of nature are strong and active; they can

fight when necessary, or they can fly swiftly from their enemies; but the profoundest philosopher, and the strongest advocate for nature, would confess that no Arabian, browzing on the simple herbage of the field, would be equal to the continued exertions of Eclipse: therefore, if we expect peculiar and unnatural exertions, we must also give unnatural powers; and this we do by our grooming and high feeding: but as this is a deviation from Nature, so she always punishes it with a tendency to disease, which we again counteract by art.

Horses under strong exercise require full feeding; and so long as the exercise is proportioned to their feeding, they seldom hurt; but there are times when we do not want to exert them, and yet we wish to keep them in a state to be able to do it when we do want their exertions; and it is at this time they frequently suffer; for the necessity of exercise proportioned to their keep is not sufficiently considered, or the time cannot be spared, or servants neglect them; and thus the horse becomes pursive, accumulates fat, his legs swell, and his heels crack, and at length become greasy; and which must necessarily be the case: for the receipts of the constitution being great by the high feeding, so the outgoings, by perspiration, &c. &c. ought to be large likewise; and if the secretions do not find their natural vents, they will find themselves artificial ones.

The muscles are composed of fibres, having a contractile power, by which all the motions of the body are performed. These fibres act best when they are in a right line to each other; but it is not always that they are so placed. Every one has seen beef, where the fleshy fibres (which form the muscles of the ox) were interspersed with fat: it is the same sometimes with horses; and these muscles, therefore, having their fibres separated from each other by the fat, cannot act to advantage.

The absorbents of the body, or the vessels that are continually taking up both solids and fluids, are stimulated to act in various ways. *Exercise* is one of the strongest of these; it is by these means, therefore, that fat horses are made lean: for this fat is taken up from the interstices of the muscles, and placed where there is less pressure; so that the horse, if well fed, still continues lusty, but the fat becomes more advantageously disposed. *Exercise* enlarges the muscles, for Nature endeavours to become equal to her wants; therefore, when horses or dogs are trained for hunting or racing, they should have regular and long continued exercise. *Exercise* improves the wind, by taking up the surrounding fat from the heart and chest, and thus allowing the lungs to expand: it also enlarges the air cells of the lungs; and hence, by imbibing more air, the animal can remain longer between his inspirations.

To give rules as to what quantity of exertion is necessary, we should know exactly what is the age, constitution, and feeding of the horse. A young horse requires more than an old one; but, if very young, it must then be neither very fatiguing nor very long continued. Some colts are observed to come out of the hands of

the breaker with windgalls or splents. A full-fed horse should have his exercise continued for some time: if once a day only, not less than an hour and a half, or two hours; if twice a day, which is most proper, an hour each time. Horses exercising should be always walked a considerable way; they then may be gently trotted, and, if intended for hunting or racing, may be moderately galloped. I am not here giving directions as to the training for either; I am only speaking of exercise as necessary for health. Many valuable horses are spoiled by servants exercising them. Grooms have most of them a very heavy hand on a horse, and conceive the principal use of the bridle is either to hold on by, or to stop the horse; whereas a good rider considers the bridle as having various other important uses, and as such he wishes his horse's mouth to remain susceptible and tender. Servants should, therefore, always ride to exercise on a slavering bit made very thick, and never be allowed a thin snaffle. It is usual with them, when exercising, to gallop their horses against each other; and a horse frequently gets more severe exercise in one hour's work with the servant, than in a week's riding of the master's: to prevent this, horses should either be exercised within sight of the house, or on some road where they may be now and then seen by some one interested in the management. Another injury horses sometimes sustain in being exercised, is in their temper; for, if they commit the most trivial fault, they are punished by the groom without mercy, which, in the end, makes them resist, and they become restiff: not to mention their heating their horses, and then stopping with them at a public house to drink. All these evils should be guarded against by circumspection and watchfulness. However a horse is exercised, he should never be brought home hot, otherwise he frequently contracts serious indisposition: this is more particularly hurtful, if, as is frequently the case, he is washed with cold water, and permitted to dry at leisure; which is always a bad custom, for the heat and moisture encourage a determination of blood to the legs, and occasion swelling, and often grease. A horse, therefore, should be brought home after his exercise as cool as possible, and, if washed, he should be carefully rubbed dry. Friction may be considered as a species of artificial exercise, and as the best substitute; and whenever, therefore, circumstances prevent exercise, a greater share of hand-rubbing should be made use of.

PART THE SECOND.

THE

Anatomy of the Horse;

OR,

A DESCRIPTION

OF

THE STRUCTURE, FUNCTIONS, AND ECONOMY,

OF

ALL THE PARTS OF HIS BODY.

Sect. VIII.

THE ANATOMY OF THE HORSE.

ANATOMY teaches the structure, functions, and economy of the various parts of the animal frame. It appears best taught by considering it under the several heads of

Osteology	or the doctrine of the	Bones
Syndesmology		Ligaments
Myology		Muscles
Bursalogy		Mucous Capsules
Angiology		Vessels
Neurology		Nerves
Andenology		Glands
Splanchnology		Viscera
Hygrology		Fluids.

In the following detail, I have, throughout, blended the functions of parts with their formation; the one illustrating the other, and both being essential to the art it is proposed to teach.

OSTEOLOGY.

BONES are hard, white, insensible bodies, upon which the soft parts are laid; thereby sustaining, and forming the base of the whole animal machine. They are formed of earth, deposited within a membrane. The deposit of their earthy part appears to arise from the vessels of the periosteum, or outer covering of the bones: hence, if by any means this membrane is destroyed, the bone in contact with it becomes carious and dies. This deposit appears to be hastened by any thing that permanently quickens the circulation, by occasioning a more speedy separation of the earthy parts from the vessels; and hence nature probably gives to young animals their playful disposition, which increasing the flow of blood, occasions a more free deposit of the earthy particles, and an earlier evolution of all their parts: hence, likewise, the inhabitants of warm climates come to perfection sooner than those of the northern regions. By preternaturally hastening the earthy deposit before the membranous part of the bone becomes fully evolved, it is evident that though the bones may be consolidated more early, yet they do not attain their natural size; that is, that by this means the growth becomes checked. Thus we learn the reason why horses early and hard worked, never arrive at their full size. Pressure likewise appears to assist ossification; thus, parts long exposed to it, as the cartilaginous ends of the spinous processes of the vertebræ, ossify from the pressure of the

saddle. From this pressure, also, it is that horses early worked put out splents and spavins.

The earth of bones is continually changing, and fresh is deposited in its room: this change is effected by their absorbing vessels. The cavernous part of a bone is lined by a membrane, called the internal periosteum, which appears intended to retain the *medulla* or *marrow*, which is an oily fluid poured into the cells of this membrane, and is secreted from the large blood vessels that are seen entering the bones. Bones themselves, though furnished with nerves, are not endowed with much feeling, except under inflammation; and as being but little vascular, their living power is small: hence they, with difficulty, take on disease; but when they do, they are less readily restored than more vascular parts. But a disposition to ossific inflammation, and a throwing out of bony matter, is more frequent in the horse than in any other animal we are acquainted with. Bones, to increase the surface of attachment of tendons, and to remove the axes of the tendons farther from the centre of motion, have frequently bony appendages, termed *epiphyses;* most of which, in the adult subject, become processes, and receive various names, according to their form. The depressions and cavities in bones receive also appropriate terms. The deep are called cotylæ, and the superficial glenæ.

The *connexion* of bones is termed *articulation*, of which there are three classes; *diarthrosis, synarthrosis,* and *symphysis*.

Description of Plate I.

Head.

a, b, c, d, os frontis. Only one can be seen, the suture dividing them, which is the sagittal, is exactly in front of the head; *a,* the coronal suture; between *a* and *b,* the orbitar apophysis, with the superciliary foramen on it; *b,* the portion of the frontal forming the orbit; *d,* the portion uniting it with the malar and palatine bones; *e, f,* parietal bone; *e,* its junction with the occipital by the lambdoidal suture; *g, h, i, k,* occipital bone; *g,* occipital protuberance; *h,* its cuneiform process; *i,* the condyloid process received into atlas; *k,* the pteregoid process which is peculiar to the horse. *l, m,* Temporal bone, the squamous portion is seen just above the zygomatic arch; joined to the parietal by the squamous suture; *l,* the petrous portion forming the internal ear; *m,* the zygomatic process forming the zygomatic arch, seen uniting with the orbitary process of the frontal, and the zygomatic process of the malar by two sutures; *n,* malar, jugal, or cheek bones; the dark line immediately under, is the spine, which is continued into the maxillary; *o,* os unguis; *p, p,* nasal bones; *q, r, f,* superior maxillary; *q,* the portion uniting with the malar and palatine bones; *r,* that uniting with the malar and angular; the triangular space shews a portion of bone that is sometimes formed between, called os triquetra; *f,* the inferior portion uniting the inferior maxillary; between *r* and *f,* is seen the superior maxillary canal. *t,* the inferior maxillary bone; *u, v, l, m,* maxilla posterior, or lower jaw; *u,* the branches; *v,* posterior maxillary canal; *m,* above this and below; *f,* the coronoid process passing under the zygomatic arch.

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Vertebræ.

a, *b*, the seven cervical vertebræ; *a*, the atlas; *d*, *e*, *f*, dentata or second; *d*, its single transverse process; *e*, its upper oblique process; *f*, its ridge answering for a spinous process; *g*, *h*, *i*, *k*, *l*, *m*, *n*, third cervical vertebra; *g*, its body; above the letter is the hole for the transmission of the vertebral arteries and veins; *i*, *k*, anterior and posterior transverse processes; between *h* and *i*, is a hole through which the cervical nerves pass; *l*, anterior protuberance in the body; *m*, the spinous process; *h*, the upper oblique processes; *n*, the lower oblique processes; 1, 18 marks, the 18 dorsal vertebræ; *a*, the body; the space between each is filled by a cartilago ligamentous substance; *b*, the transverse processes articulating with the head of each rib; *c*, their upper oblique processes; *d*, their lower dicto. 1, 5, the five dorsal vertebræ, their transverse processes are very long, but by the fore shortening in the perspective, are not very evident in the plate; *x*, *x*, the sacrum composed of five pieces; the spinous processes are the only parts distinct; the transverse are united into one unequal roach part; 1, 13, the coccygis or bones of the tail; the spinous and transverse processes are distinct only on the first four or five.

Sternum, Ribs, Shoulder, and anterior Extremities.

a, *b*, 1, 9, the true ribs; 10, 18, the false ribs; *c*, the head articulating with the transverse process of last dorsal vertebra; under is seen the lower branch of the head that unites with the seventh cervical and first dorsal vertebra; *c*, the end that unites with the sternum; *d*, the sternum; *e*, *f*, *g*, *h*, *i*, *l*, *m*, the scapula, *e*, its neck, below which is seen its glenoid cavity; *f*, antica spinatus fossa; *h*, its spine, which in the human ends in the process acromion, but as there is no clavicle in the horse it ends by a tuberosity; *i*, coracoid process; between *m*, and *i*, the anterior costa; *l*, between this and *c*, posterior costa. between *m* and *l*, is its base, and the line above it, marks the extent and situation of the cartilage of the scapula; *a*, *o*, *p*, *q*, humerus or arm, *a*, its cervix, above which is seen its head; *o*, its anterior head, forming the point of the shoulder, as it is usually called, in the horse; *p*, its tuberosity; *q*, its lower head, behind is seen the cavity for the reception of the olecranon; *r*, *r*, ulna; the upper part forms the olecranon or elbow; the lower part is united by ligamentous fibres to the radius; *s*, *s*, the radius; 1, 2, 3, 3, 4, 5, 6, 7, the carpus or knee; 1, 1, pasiform; 2, 2, scaphoid; 3, 3, lunare; 4, uneiform; 5, magnum; 6, cuneiform; 7, trapezoid; *t*, *u*, metacarpus; *t*, canon; *u*, two small metacarpals; *v*, *w*, *x*, *y*, *z*, phalanges; *v*, first phanange or pastern; *w*, sessamoids; *x*, coronet bone, or little pastern; *y*, coffin; *z*, navicular or nut boue.

Pelvis and posterior Limbs.

a, *b*, *c*, *d*, *e*, *f*, *g*, the two ossa innominata; *a*, *b*, *c*, ilium; *a*, tuberosity of ilium, forming the haunch or hip; *c*, the union with ischium; *e*, *f*, ischium; *g*, *g*, pubis; and between the letters, the symphysis; *d*, foramen thyroideum; *h*, *i*, *k*, *l*, *m*, femur or thigh bone; *h*, the cervix, above which is the head received into the acetabulum of the pelvis; *i*, great trochanter; *k*, the outer trochanter; *l*, *l*, the inner trochanter; *m*, *m*, the anterior condyles; *n*, *n*, the posterior ditto; *p*, *p*, semilunar cartilages; *o*, *o*, patella; *q*, tibia or leg, commonly called the thigh; *r*, *fibula*; the tibia is seen terminating in its malcoli, to articulate with the tarsus; 1, 2, 3, 4, 5, 6, 7, 8, tarsus or hock, 1, 2, 1, 2 calcis, forming the point of hock, in man the heel; 3, 4, astragalus; 5, 5, cuneiform magnum; 6, cuboides; 7, cuneiform medium; 8, cuneiform parvum. *t*, *t*, *t*, *t*, metatarsus; *t*, *t*, canon or shank; *t*, *t*, two small metatarsals; *u*, pastern; *v*, sessamoids; *w*, coronet bone or lesser pastern; *x*, *x*, coffin; *y*, nut or navicular.

The Cranium, or Skull.

The bones of the head are divided into those of the skull, face, and posterior jaw. The junction of most of these bones is effected by *sutures.*

The *cranium*, or *skull*, is a vaulted cavity for the reception and preservation of the brain, and is composed of several pairs, and three single bones.

The *frontal bones*, as they unite by age, are frequently, but erroneously, described as a single bone. They are situated in the front of the head (*a*, *b*, *c*, *d*, *Plate* I), and receive and lodge the anterior and inferior portion of the brain. The two tables of which they are composed separate to form two cavities, called the *frontal sinuses* *, which are lined by the pituitary membrane. The frontals are united together by a continuation of the *sagittal suture;* laterally they are connected to the malar bones, by the *orbitary process*, forming the *zygomatic suture;* inferiorly to the nasal bones, and interiorly to the ethmoid and sphenoid, by the sutures of that name. The orbitar process forms the *greater orbitar fossa*, or cavity over the eye: in this process (*see plate of skeleton between* a *and* b, *bones of head*) there is a nitch or hole, called the *superciliary foramen*, giving passage to a branch of the fifth pair of nerves and blood vessels, furnishing the supercilia, and parts adjacent.

The *parietal* bones, which are square-like, are placed between the temporal, frontal, and occipital bones; and unite together by the *sagittal* suture, and to the frontal by the *coronal*, and laterally to the temporal by the *squamous* suture.

The *temporal* bones are divided into two portions, a squamous and a petrous, which in the horse remain always distinct. Considered as they are usually as one pair of bones, each has a single cavity, and is very irregular in figure, uniting with all the bones of the skull but the ethmoid. The *squamous portion* is united to the parietal by the squamous suture, and has a large peculiar process, called the *zygomatic*, which contributes with a lesser one of the malar bone, to form the *zygoma*, or *arch of the cheek:* nearly at the root of this process is a protuberant cartilaginous cavity, articulating with, and receiving the condyloid process of the lower jaw. Within the *petrous portion*, which is situated at the root of the outer ear, is a distinct cavity to each, forming the internal ear.

The *sphenoid* is a very irregular bone, and connected with all those we have described, to which it is, as it were, a key. It presents several processes, as its *alæ* or *wings;* its *orbitar apophyses;* and likewise its *cuneiform*, *occipital*, and *temporal processes.* It has within its body a cavity, called *sphenoidal sinus*, which communicates with the ethmoidal cells. It is connected to the cuneiform process of the occipital, superiorly and posteriorly to the ethmoid

* These cavities La Fosse directs to be opened, in his treatment of glanders, by the trepan. They are sometimes found filled with worms, particularly in oxen and sheep, *œstrus sinus frontis ruminantium.*

and the vomer; inferiorly and posteriorly to the squamous portions of the temporal, and to part of the palatine bone.

The *ethmoid* of the horse forms a very considerable bone; which, from an intermediate plate or septum, called *christa galli*, has been described as two: it is situated under the superior part of the nasal fossa, between the frontal and sphenoidal bones. It is made up of numerous cells of very irregular figures and direction, which are all lined with the pituitary membrane, and communicate with the frontal sinuses, terminating in the anterior turbinated bones. The *sella tursica*, a cavity lodging the pituitary gland, which in the human is in the sphenoid, in the horse forms a part of this bone: its orbitary process likewise forms the superior optic foramen, which in the human subject is formed by the sphenoid.

The *occipital*, called by farriers the *knoll bone*, is situated at the summit of the head (*vide g, h, i, k, Plate* I), and is the largest of the bones of the skull, articulating with the parietals by the *lambdoidal suture*, to the temporals by their petrous portion, and by its cuneiform process to the sphenoid. It is in the fœtal state composed of several parts. It rises superiorly into a ridge, or perpendicular process, to which the cervical ligament of the neck is attached. Its inferior surface has several processes and eminences, two of which arising from the posterior part of the bone, are peculiar to the horse, or at least do not exist in the human: they have been called styloid, but are more properly the *pteregoid processes* (*vide k, Plate* I). The *condyloid apophyses* articulate with the atlas: but the principal process is the *cuneiform*, which is very large (*vide h, Plate* I), and received as a wedge among the bones of the skull. Its principal cavities are the *foramen magnum*, giving passage to the spinal marrow, and the *condyloid foramina*, penetrating the condyloid apophyses.

Bones of the Face.

The bones forming the face, including the posterior jaw, may be considered as ten pairs, and two single ones.

The *nasal* bones (*vide p, Plate* I) are united together throughout their whole length; which union internally forms a groove, receiving the cartilaginous *septum narium*. They are connected interiorly with the anterior turbinated bones; superiorly with the frontals; superiorly and laterally with the angulars; and inferiorly with the lower maxillary. The *nasal fossæ* are formed of these bones in conjunction with the maxillaries laterally; superiorly of the posterior table of the frontals, forming the frontal sinuses, with which they communicate; and posteriorly of the palatine bones, and which fossæ are the principal seat of glanders.

The *angulars*, or *ossa unguis*, are in the horse wholly ossified, and situated at the inner angle of the eyes (*vide o, Plate* I), forming a considerable portion of the orbits. Each is nearly square, and joined to the nasal, malar, frontal, and superior maxillary; and is so formed as to present an inner, outer, and orbitary surface: between

the outer and orbitary surfaces, is the orbitary ridge: the latter of these surfaces is perforated by a canal, just within the inner angle of the eye, forming the *lachrymal duct*, or *ductus ad nasum*, carrying off the superfluous tears into the nose. This duct passes bony between the turbinated bones, and then becomes membranous under the inferior or posterior of them.

The *malar*, *jugal*, or *cheek* bones, occupy the posterior part of the orbits (*vide n*, *Plate* I), between the angular, superior maxillary, and temporal bones; to the last of which, each is united by its temporal process, which forms part of the zygomatic arch.

The *superior maxillary* bones are the largest of those strictly forming the face, and are connected anteriorly to the nasal; inferiorly to the inferior maxillary; and internally to each other, and to the palatine by their palatine processes: they are connected also to the vomer, and within the orbit to the zygomatic process of temporals. The exterior surface is convex, and has upon it the maxillary spine continued from the malar: midway between this and its junction with the nasal bone, there is a foramen continued through each of them, transmitting the second branch of the fifth pair of nerves with some vessels; all which go to supply the molar teeth: this is called the *anterior maxillary canal*. Its inferior edge is pierced by the molares. By their junction with each other posteriorly, they form the inferior portion of the palatine arch, or roof of the mouth; the superior part of which arch is formed by the palatine bones themselves, to which the maxillary are united. At the inferior portion of this arch, these bones recede as it were to give place to a pair of bony plates, which, as they appear in a great measure distinct, should be called, I think, inferior palatines. The cavity formed by the internal surface of each of the maxillary bones lodges the turbinated, with which the cavity is nearly filled: therefore, what has been described by authors as maxillary sinuses, and so often mentioned as such by La Fosse, are in fact *turbinated* sinuses. (*Vide q*, *r*, *s*, *Plate* I.)

The *inferior maxillary* bones have been by the French authors overlooked, being constantly considered as part of the anterior, though the division is as evident, as that between the frontals and parietals. Mr. Stubbs likewise falls into the same error. These bones are wanting in the human, and are peculiar to animals with long jaws; they unite together by symphysis, and to the inferior maxillary and nasals by the suture, called harmony. They concur in forming part of the nasal fossæ, and at their inferior edge have six *alveoli*, lodging the anterior incisive teeth. The tush is sometimes lodged in the posterior edge of this, and sometimes in that of the superior maxillary. At the symphysis is a foramen giving passage to vessels and a nerve. (*Vide t*, *Skel.*)

The *superior palatines* are situated at the upper part of the bony palate, beyond the superior maxillary, to which they unite, and jointly form the arch of the palate: superiorly they unite to the wings of the sphenoid, and leave an oval opening between them and

its body, which forms the entrance of the nasal fossa into the pharynx.

The *inferior palatine* bones. I believe I am singular in considering these as distinct from the superior maxillaries, with which they are usually described, and considered as portions of. But I think they merit this distinction, and as such I have introduced it: they are small frangible plates; their greatest portion being received between two receding portions of the superior maxillaries, but now and then their inferior part is received between similar portions of the inferior maxillaries.

The *pteregoid* are two small crooked bones, about which likewise authors differ. Bourgelat considers them as portions of the palatine bones; by others they are described as their styloid processes: but they may be regarded as detached distinct bony portions, situated between the vomer and palatines, forming a cartilaginous ring, through which passes the tendon of a muscle of the palate.

The *anterior turbinated* bones are thin, bony lamellæ, that occupy part of the space formed by the cavity within each superior maxillary bone. They are connected with the nasal bones, and receive the continuation of the ethmoidal cells, and are seen, on opening the nostrils, forming a species of tortuous cavity.

The *posterior turbinated* bones occupy the remainder of the cavity of the maxillary bones, and by their mutual tortuosities in these, have been called by the French the inferior cornets of the nose, as the anterior are called the superior cornets. The turbinated bones are very spongy, and slight in their texture, being sieve-like, and have sometimes in glanders become absorbed: they increase the surface of the pituitary membrane, which is the reason they are so considerable in brutes, and so trivial in man.

The *vomer*, or ploughshare, extends from the inferior part of the nasal fossæ, so as to divide, in conjunction with the cartilaginous septum, the nostrils into two equal cavities; superiorly it joins the sphenoid, and inferiorly is received into a groove of the palatine process of the maxillary bone: it is likewise connected with the ethmoid.

The *posterior maxillary* bone, or *lower jaw*, is composed of two pieces, intimately united by symphysis at the chin. The anterior edge, by a separation of its tables, forms the *alveoli* for the reception of the molares or grinders, the tushes, and incisive teeth. The inner surface presents a foramen, called the *posterior maxillary canal*, which gives a passage to the third branch of the fifth pair of nerves, and to an artery and vein, which furnish the teeth with nourishment. The inferior part of the anterior edge forms the *bars* on which the bit rests. At the superior portion, this bone on each side turns up into two considerable branches; the external angle of each of which is the thickest of the whole, and is called the tuberosity; the branches end in two processes with an intermediate groove. The first and most superior of these, is called the *condyloid process*, and forms a flat head tipped with cartilage articulating with a cartilaginous depression of the

zygomatic process of the temporal (*see Skel.*), between which articulations is placed, as in the human, a moveable cartilage, accommodating itself by its figure to the motions of the jaw. The second is the *coronoid process*, and is flat, passing under the zygomatic arch (*vide f and m, Skel.*), and having the crotaphite muscle inserted into it. From this, the use of this arch becomes evident; for was it not for this guard, every accidental pressure, and every slight injury, would impede the motion of the jaw, and starve the animal. The whole likewise of this bone shews the most admirable mechanism: the molar teeth, on whom most is dependant, and whose exertions are greatest, are placed nearest the centre of motion: and as the upper jaw in most animals is nearly fixed, so it was necessary the lower should have considerable extent of moving power for the purpose of grinding, and it is accordingly so formed as to admit of motion in every direction. The condyloid process is attached to the temporal bone by a ligament, which inserts itself behind the zygomatic process, and by a large capsular ligament. On the contrary, the coronoid process is attached by means of the crotaphite tendon: had this been a ligament as well as the former, the mouth could not have been opened sufficiently, as in the act of gaping; and without this additional attachment, the condyloid articulation would not have been sufficiently strong.

The *os hyoides* is composed of five bony pieces, which are so distinct, that it has been by some described as five bones. It is situated at the root of the tongue, and articulates with the skull by means of the temporal bone; by which it is rendered very useful as an attachment to the muscles of the tongue, and of the larynx and pharynx. (*Vide i, i, Plate III, fig.* 2.) It is divided into a body, two larger, and two lesser branches. The body forms a species of cross, that articulates with the first cartilage of the larynx, and then gives an appendix pointing towards the teeth, to which the tongue is attached. On each side of this are the little branches uniting with the body by a moveable articulation, and to these the larger branches unite by an acute angle, and enlarging, extend up into the head, within the membranous cavity of the eustachian tube. (*Vide d, fig.* 1, *Plate III.*)

Description of the Teeth.

The *teeth* are the hardest and compactest bones of the body, and are situated in cavities between the tables of the jaw-bones, which are called *alveoli:* they are usually forty in number in the horse (and thirty-six in the mare), the latter commonly wanting the tushes. They are divided into *incisores*, *cuspidati*, and *molares*, or, as they are called by farriers and horsemen, *nippers*, *tushes*, and *grinders*. Each tooth is formed of a crown, neck, and root. The crown is the upper part, composed of a shining compact portion, called enamel, and one less so, of the nature of common bone; the neck is not very evident in the adult horse, but is more distinct in

the colt. The roots are received into the alveoli, and are not spread out into distinct fangs as in the human, but are more cone-like.

Most quadrupeds have during life two sets of teeth, a *temporaneous*, or *milk set*, and a *permanent*, or *adult set*. The first usually appears at, or soon after birth; the other about the adult period. This change, by which the milk are displaced for the permanent set, is very gradually performed, some years elapsing between the appearance of the first and the last; by which means the animal suffers no inconvenience: were they all, or even several of them, to remove at the same time, the animal would probably starve.

It is a curious fact, that though the two sets of teeth appear, with an interval of some years between them, yet that the rudiments of both are formed nearly at the same period; at least we know, that as soon as the temporaneous are evident, the traces of the other can be distinguished immediately under them, and only are prevented from making their appearance by the pressure occasioned by the first: thus, when one of the first set is drawn, its place is soon filled up by one of the second set; and this appears the reason of their early formation, that they may be always ready to fill up any accidental displacement that may occur before the usual period. Dealers know this early appearance of the second set when the others are removed, which they frequently effect by artificial means, to make young horses appear older than they are.

It was essentially necessary there should be two sets of teeth, for as they grow but slowly in proportion to the jaws, so, had there been but one set, the disproportion in growth between the teeth and jaws must have separated, and made them wide apart as the jaws increased; hence there is given at first a small and less numerous set, adapted to the size of the jaws; but as the rudiments of the second are larger and more numerous, though early formed, so they take up more room, and are actually at this early period situated within the branches of the posterior jaw; so that they necessarily evolve only, as the jaw lengthens out. The removal of the first set is occasioned by an absorption of their fangs or roots; which absorption is brought about by the stimulus of pressure, from the teeth underneath. The living powers in the teeth are kept up, as in bones in general, by nerves and blood vessels, which may be traced entering the hollows in the roots. The nerves enter by means of the anterior and posterior maxillary canals, as we have described; nor have we any reason to doubt their having absorbents; but, on the contrary, we see that their growth is increased till the adult period, and the roots of the temporaneous are removed by absorption. The teeth of quadrupeds are not so liable to a diseased decay as the human, yet now and then it does happen.

The *enamel* is a particular deposit, not following altogether the nature of bone, and is placed differently in different animals. In the human and carnivorous brutes, it is all placed exteriorly as a covering to the teeth, giving them firmness. In granivorous animals,

on the contrary, it is placed in perpendicular plates within the body of the teeth, where, by its great hardness, it always keeps up a rough grinding surface; for, as there is by this means alternately a perpendicular layer of common bone, and a plate of enamel, so as the bony part wears more readily than this, there remains always a number of inequalities on their surface, admirably adapting them for the purposes intended; and by this formation they remain perfect to the last period of the animal's existence.

The teeth are the only bones that are without the investment of the periosteum, being in their crown and neck uncovered, but their roots are surrounded by the proper membrane of the gums.

The *incisive* teeth are six to each jaw, and in older books of farriery are called, the two front ones, nippers; the next, gatherers, or separators; and the outer, corner teeth. The French name them *pinces*, *mitoyenne*, and *coins*, but it would be better to say the first, second, and third incisives, beginning at the corner. These teeth are curved, which is favourable for the pressure they undergo, the upper are more so than the lower; they have two surfaces, an inner and outer, the inner is rounded, but the outer has a groove up the middle. Their upper surface presents a hollow, which, as it wears away in some degree at certain periods, is regarded as a criterion of the age, and, in fact, forms the best mode of judging of the number of years the animal has lived, particularly of the early periods of his life. The incisive teeth differ from each other slightly in appearance; the corner ones are nearly triangular *(see Plate II)*; these have likewise a species of artificial side, or internal wall, which does not grow to a level with the rest for some time after it appears.

The *cuspidati*, *canine*, or *tushes*, are usually wanting in mares, and are four in number, one on each side of the upper and lower jaw, in the space between the incisive and molars. Those of the anterior jaw are usually nearer the nippers than the posterior. There are but one set of these, which appear at the adult period growing slowly, and when completely evolved they present a curved appearance, turned inwards, with an outer plain surface, and an inner one that has two perpendicular grooves, with an intermediate rising: the end is pointed, which by age wears away along with the internal grooves, leaving the tush blunted, and the internal surface smooth and equal with the outer; this, therefore, may be a guide, when a horse has been suspected to have been *bishopped*.

The *molares* or *grinders* are twelve to each jaw. The upper are larger and stronger than the under, as they form the fixed point upon which mastication is performed. Their upper surface presents nearly a long square, the first not so complete as the rest, being nearly triangular in many instances: this surface is very uneven from the alternation of the enamel and bony portions; and as the anterior teeth hang over the posterior, so the ridges of the one set, are received into the depressions of the other, by this means permitting the mouth to shut completely in a state of rest.

The Bony Trunk.

The *trunk* of the horse consists of *spine*, *pelvis*, and *thorax*, or *chest*.

The *spine* is formed of seven cervical, eighteen dorsal, six lumbar, and five sacral vertebræ, with the addition of an indefinite number of small bones of the coccygis, or tail, usually amounting to about thirteen. The spinal bones are thus divided, on account of the varieties they present; but they have some characteristics in common. Each is composed of a spongy considerable substance, called its *body*, and parts protruded from this, called *processes*. These processes unite to form a hollow, through which the spinal marrow is transmitted, and by some of these processes, the vertebræ are articulated with each other, as well as by their bodies anteriorly and posteriorly; by which means their surface of attachment is much increased, and the strength of the spinal column is rendered very great. Though but little motion is allowed between any two vertebræ, yet the flexibility of the whole spine is considerable; by which wise contrivance the spinal marrow, nerves, and blood vessels, are not liable to compression.

The *cervical vertebræ* are by far the largest of the whole, and are those situated within the neck, called by farriers and butchers the *rack bones*. They have but a very indistinct spinous process. By a common base on each side, arises a very considerable prominence, which branches out into two transverse processes, and at the base of this prominence is a foramen for the passage of the vertebral arteries and veins. Each vertebra likewise forms a groove posteriorly, which, united to one in the opposed vertebra, produces a hole communicating with the great spinal canal passing through them, by which holes the cervical nerves pass. (*See description of Skel.*) They are connected together by a round head in each, received into a corresponding cavity at the posterior part of every one but the first; and which union has articular cartilages, and strong capsular ligaments. It will be evident, that from the strong means of articulation they have with each other, not only by the round head and corresponding cavity, but more particularly by their oblique processes, that no dislocation can take place between any of them but the first and second; in which case the animal must die, from the compression of the spinal marrow; and this is what is usually called breaking the neck. The first cervical vertebra (*vide a vertebræ, Skel.*) branches out laterally into two transverse portions, and anteriorly articulates with the occipital, receiving into its fossæ the two condyles of that bone, between which is situated the spinal canal; on each side are two foramina, one of which transmits the vertebral vessels, and the other a pair of nerves. Posteriorly it articulates with the second, by receiving its odontoid process into its great cavity. This vertebra is the only one that has not the cervical ligament attached to it, which would have interfered with its freedom of motion.

The second cervical vertebra is named *dentata* (*vide d, e, f, plate*

of Skel. vertebræ), from a considerable tooth-like process instead of a head, which is received into the great cavity of the atlas; it has a considerable dorsal ridge instead of a spinous process (*vide f*): its anterior oblique processes are blended together, and appear a mere extension of its body; its posterior oblique processes articulate with the upper oblique processes of the third vertebra (*vide h*), and the posterior part of the body has a cavity for the reception of the head of that vertebra. Its transverse protuberance has only its posterior point (*vide d*), so that this bone presents a single transverse process on each side; the foramina are the same as in the former. Between this and the atlas, is a space where the spinal marrow is left unprotected but by the cervical ligament (it is readily seen in the plate of *Skel.*): and it is at this part butchers sometimes plunge a knife into what they call the pith of the neck, when they want to kill without effusion of blood; from whence it is called *pithing*.

The third, fourth, fifth, and sixth cervical vertebræ have, instead of an odontoid process, a round head, articulating with the cavity of the one that goes before them. Their upper oblique processes (*vide h*) are distinct, and articulate with the lower of the one preceding them, and their lower (*vide n*) with the upper of the one immediately behind. Their transverse processes are two on each side (*vide i, k*); their dorsal ridge small, and their bodies altogether less than the second. At the base of their transverse processes they have a similar foramen for the transmission of the vertebral vessels, and the hole through which the cervical nerves pass out may be seen in the plate.

The *seventh cervical vertebra* is smaller than the others, and has no foramina for the transmission of the vertebral vessels, and but a small single transverse process on each side, but its spinous is larger than the others; its posterior oblique processes articulate with the first ribs, and it has a concave articular surface in its body for the head of the same rib: it will be found altogether, to blend its character with the dorsal vertebræ.

The *dorsal vertebræ* are eighteen (*vide* 18 *vertebræ, Plate* I), and do not essentially differ from each other, but in the length of their spinous processes, which in the first seven or eight is considerable, for the purpose of giving a long lever to the dorsal muscles. It is these processes that give height to the withers; and as they are covered with muscles that act on them strongly, so their length is of great consequence to progression. Their oblique processes are four to each, but are small, as well as the two transverse. They articulate with each other by their anterior and posterior surfaces, and by their oblique processes; and each articulates with two ribs on each side. As they advance in number they increase in size; and are pierced by the spinal canal, and transmit by their lateral holes the spinal nerves; but they have no foramina at the base of the transverse processes. Between each is interposed a substance of the mixed nature of cartilage and ligament, which is most compressible at its

sides, permitting the motion of the spine, and forming by the solidity of its centre, a fulcrum or pivot for the bones to move on.

The *six lumbar vertebræ* differ but little from the dorsal; their bodies are rather larger, and their spinous processes consequently rather broader; but their transverse processes bear no comparison to the others: for as there are now no ribs to protect the contents of the abdomen, nor to support the dorsal muscles, consequently these are much lengthened out; and they have hence no articular surfaces but those by which they unite with each other. The last of them joins with the sacrum. (*Vide* 1, 5, *vertebræ*, *Plate* I.)

It will appear evident from the foregoing description, that these bones enjoy different powers of motion: the head is enabled to rotate and move extensively upon the first; and the first moves freely on the second. The remaining cervical vertebræ have likewise much motion from the form of their articulation, and the smallness of their spinous ridge. The dorsal can have little freedom on account of the straightness of their union, and the situation of the ribs; while the lumbar have rather more, though from the length of their transverse processes it cannot be much.

The vertebræ of the spine in the horse very seldom take on spontaneous ulceration: but are liable to malconformation, being sometimes curved upwards, and sometimes downwards more than natural. They are also liable to have bony matter thrown over their cartilages; so much so sometimes as to anchylose nearly the whole dorsal and lumbar joints. It is this that in old horses makes them so stiff, and so unwilling to lie down; or when down, to rise up again.

The *pelvis* is composed of the *sacrum*, two *ossa innominata*, and *coccygis*. The sacrum and coccygis are called the false vertebræ. The *sacrum* presents five processes, answering to the spinous of the other vertebræ, and has likewise lateral protuberances which run into each other by age. It articulates with the last lumbar vertebra by a kind of head, and likewise by two articulating surfaces uniting with the oblique processes of this vertebra; and forms also a groove to unite with a similar groove in it for the transmission of the last dorsal pair of nerves. It is itself pierced at its under part with two rows of foramina, for the passage of the sacral nerves from the cauda equina, or continuation of the spinal marrow. It likewise has two articular surfaces by which it joins the ilium, and its posterior extremity unites with the first bone of the coccygis, or tail. (*Vide x, x.*)

The *coccygis*, or *bones of the tail*, vary in number from eight to sixteen: they are united together by articulating surfaces, and corresponding capsular and lateral ligaments: the first have the marks of spinous and transverse processes (*vide Skel.*), and part of the cauda equina is continued to the fourth or fifth.

The two *ossa innominata* (*a, b, c, d, e, f, g, Skel.*) are usually described as three pair of bones, though all traces of their distinct existence are lost long before the adult period: in animals intended to walk as soon as born, they are consolidated even at birth, and

are only separate in a fœtus of three months. These three portions, are the ilium, ischium, and pubis. The *ilium* (*a*, *b*, *c*, *Skel.*) is the most considerable, and forms the haunches, or haunch bone, by a large unequal protuberance (*vide a*), which, when very prominent, makes the horse what is called *ragged hipped*. From the tuberosity, it runs towards the sacrum, and turns up into a sort of spine very different from the human, articulating by its inner surface with the sacrum (*vide b*). Its posterior angle unites with the sacrum: its anterior is rough, and gives attachment to the abdominal muscles, and the inferior unites it with the ischium and pubis.

The *ischium*, or *hip-bone*, is a larger portion of the innominatum than the pubis, but less than the preceding (*vide e*, *f*). It has three angles, and an inner and outer surface: by the anterior of these angles it unites with the ilium and pubis, and forms part of the *cotyloid cavity*: by its posterior it stretches back jointly with the superior to form a curved process, called its *tuberosity* (*vide f*), which is very different to the same part in the human. Its superior angle is convex, and gives attachment to the sacro-sciatic ligament. Between the anterior and posterior angle, it forms, jointly with the pubis, the oval cavity, called *foramen thyroideum*, or *ovale* (*vide d*).

The *pubis*, or *share bone* (*vide g*, *g*), is the least of the three, but assists in forming the *acetabulum*, or cotyloid cavity, for the reception of the head of the femur. By its anterior edge it unites with the ilium, and with its fellow, forms the *symphysis pubis*. The acetabulum is, we have shewn, formed by the assistance of each of the above portions, but in unequal degrees; the pubis adds least, and the ischium most. The depth of this cavity is greatest superiorly and anteriorly, where the danger of dislocation is most; at the lower portion it is very superficial, and has a kind of interruption, by which formation the thighs are enabled to cross and pass under the body: but that this interruption might not endanger the safety of the articulation, it is filled up by a ligament, and the whole brim is deepened by a cartilaginous crust round it; from which wise precautions, the thigh bone is very seldom thrown out of this socket; though now and then it may happen (see *Dislocations*). The pelvis is strongly attached to the sacrum by the articulating surfaces we have described, and held in these attachments by strong ligaments from the anterior and posterior edge of the articular part of the ilium, uniting it to the risings corresponding with the transverse processes of the sacrum. The whole of the large posterior opening between the innominata and sacrum, is filled up by two strong layers of ligament, which in the animal should be called its *sacro-iliac*, and its *sacro-sciatic ligaments*. These two layers permit the pyriformis muscle, the sciatic nerve, and posterior crural vessels, to pass out of the pelvis. From this, therefore, it may appear, that the pelvis forms a very complete cavity, having all its openings

closed either by ligaments, muscles, or integuments, except an abdominal one before, and an excretory behind.

The *thorax*, or *chest*, comprises the sternum and ribs. The *sternum* of the horse differs very much from the human breast-bone, which is a perpendicular flat pile of bones; but in the horse is inclined, and similar to the keel of a vessel, furnished at both ends with a cartilaginous portion; that of the posterior being considerable, and from its figure called *xiphoid*, or *ensiformis*. It is in the colt composed of six pieces, which unite in the adult: the three anterior portions are sharp, and covered with cartilage; the remainder are flatter. The two lateral surfaces receive the cartilaginous extremities of the true ribs. (*Vide d, Skel.*)

The *ribs* are long perpendicular bones, with one end attached to the spine, and the other connected with the sternum, either directly or indirectly. They are usually thirty-six, eighteen to each side: eight of which articulate with the sternum, and are thence called *true ribs;* while the other ten unite together by intervening cartilages, and are called *false ribs*. The central ones are the longest, gradually decreasing in length both towards the neck and loins. The first is placed almost perpendicularly, the second less so; and their curvature, as well as their inclination, increases as they advance, so as to enlarge the dimensions of the chest, till it becomes nearly circular (see *Plate of Skeleton*). As they proceed towards the pelvis, their inferior extremity is carried backwards, increasing still more the dimensions, and strengthening the parietes of the abdomen. Each of them has a body, an upper and lower extremity, and an upper and under surface. The upper extremity presents a small head (*vide a*), and a small tuberosity: this head articulates by two surfaces to the bodies of two vertebræ, and the tubercle with the transverse process of the posterior of these two vertebræ. The upper extremity is rounder than the body and inferior extremity. The anterior edge of each has a groove, in which run the intercostal vessels and nerve, which it is very necessary to be aware of in operations on the chest. Above this likewise is a ridge to which the intercostal muscles are attached, fixing themselves into the opposite edge of the next rib. To the lower extremity is a cartilage firmly attached, articulating with the sternum, or with each other.

The ribs are fixed to the breastbone and spine by strong ligaments: each lower extremity has attaching fibres fixed into the articular pits in the sternum; and the upper extremity is connected by articular, as well as capsular ligaments. It must be evident that the ribs in the horse have but little motion, and that what they have, must be forwards, particularly in the true; the first of which is completely a fixed point for the rest to act upon: but the false can be elevated a little, by means of the flexibility of their inferior attachment, and which appears the reason they are thus attached. But even this would not be sufficient without some other contrivance to enlarge the chest during inspiration, which is effected by a very moveable

diaphragm. The animal thorax could not have been formed as the human, without detracting from the ease and stability of motion; hence to approximate the fore extremities, it was necessary to flatten the chest: yet a posterior expansion of this cavity is not only allowed, but required, and is as essentially necessary to the horse as to the man. The greater convexity the ribs have, the more the chest has a cylindrical form, which is of all others the most extensive; and hence capable of carrying on its functions to greater perfection; and as the belly always partakes of the form of the chest, so a flat-sided horse is always without much carcase.

The Anterior Extremities.

These bear but little resemblance to the human arm, particularly in those quadrupeds, as the horse, who have but one phalange: in those with several, the resemblance approximates much more, till in the fore extremities of the ape, they differ but little but in the thumb, which forms a bad antagonist to the fingers. It appears a very wise provision of nature, who has given a colt very long limbs at birth, that the form of parts might not be much altered in their future evolution; but, at the same time, the hinder ones are by much the longest; because, were the fore equally so, the young animal would have been too much elevated from the ground, and rendered incapable of grazing, or even of sucking conveniently.

The *scapula*, or *shoulder blade*, is a broad, and rather triangular bone, applied to the chest, so that its apex reaches between the first and second ribs, and the posterior part of its base as far as the seventh. It is situated obliquely, with its largest portion above, its internal surface flat and smooth, and its external divided into two unequal portions by its spine. Its anterior edge (*vide m, i*), as it continues down, contracts inwards, and ends in a blunt rounded extremity, called its *coracoid process;* but which in the horse is not very beak-like. Its superior surface is furnished with a considerable cartilage, strongly adhering to it by ligamentous fibres, by which the surface of attachment of the muscles of this part is much increased; yet the weight and thickness of the bone but little augmented. The posterior edge inclines inwards, and ends in the cervix, or neck of the scapula, and which neck terminates in a superficial cavity, receiving the head of the humerus or arm, and called the *glenoid cavity* (*vide e*). The *spine* (*vide h*) is a rising which divides the external surface into two portions, till towards the lower part, where it forms a rounded extremity, which in the human is stretched out, to form a sharp process, called processus acromion; but which, as there was no clavicle to articulate with in the horse, so this formation would have been useless. The two portions it forms, are called the *antea* and *postea spinatus fossæ*. The antea spinatus fossa (*vide f*) is the least and most superior; the postea spinatus fossa is the larger and most inferior (*vide g*).

The scapula is attached to the chest by very strong muscles, but has no bony, nor any ligamentous union; unless the strong aponeu-

rotic expansion from its cartilaginous base can be so considered: it is particularly held in its situation by the serratus major, which is so spread as to attach the scapula, and sustain the chest by its very strong tendinous fibres. At its lower part it is fixed by the pectoral muscles; and we accordingly find, that when from a slip, the legs have been forced too wide asunder, forming what is termed a shoulder wrench, these muscles become tumefied and tender. By this muscular attachment, this bone has much motion round its own centre, having no clavicle to confine it. Its usual situation is, to a plane perpendicular to the horizon, an angle of thirty degrees, and has a motion in its greatest extent of twenty degrees; hence as it does not pass beyond the perpendicular backwards, so the more oblique its situation, the more degrees in the circle it can occupy; and thus can assist the action of the humerus in this degree. The use of this bone is to serve as a moveable point to the arm, which greatly enlarges the motion of the whole extremity, and renders it more extensive than that of the hinder. Hence it becomes also evident that a glenoid cavity is fully able to protect this articulation; and that a dislocation between the scapula and humerus, as being so moveable, is even less frequent than between the acetabulum and femur, where the os innominatum is not able to follow the motion of the thigh.

The *humerus*, or bone of the real *arm*, is strong and short, very unlike the same bone in man. It extends from what is called the point of the shoulder to the elbow (*vide n, o, p, q, Skel.*), forming an angle with the scapula, extending obliquely backwards, as the shoulder does obliquely forwards. At the posterior part of the extremity, the bone stretches out into a round head supported on a cervix (*vide n*), with a circular fossa surrounding its base, for the insertion of the capsular ligament; this head is received into the glenoid cavity of the scapula. The anterior part of this upper extremity is what is improperly termed the point of the shoulder (*vide o*), and has three prominences, into which the extensor muscles of the arm are inserted; and between the two most anterior of which the firm flattened tendon of the flexor radialis anticus passes, tied down by a ligament across. This tendon is almost of a cartilaginous hardness, and is flattened out into a species of patella to this articulation; answering all the purposes of the patella of the knee, and effectually preventing any dislocation of this joint forwards; which is the only point in which it would otherwise be at all probable. The body of this bone has an external and internal tuberosity, for the insertion of adductor and abductor muscles; and as it proceeds, becomes broader, and at its superior extremity terminates in its inner and outer condyles (*vide q*), which are divided by risings and depressions, articulating with similar depressions and risings in the superior extremity of the radius; thereby confining the motions of this joint to flexion and extension. In the front of this extremity is a cavity to receive the protuberances of the radius, in the greatest flexions of the fore arm; and behind there is a very deep depres-

sion for the reception of the olecranon or elbow, when it is extended again. The humerus is attached to the scapula by a capsular ligament, which extends from this bone to the cervix of the omoplate or shoulder blade; over which are extended, both externally and internally, strong ligamentous layers from one bone to the other; and when are added to this, the peculiar tendon I have described, and the tendinous expansions of the other muscles, it will be seen that this articulation is very strong.

The *fore arm* is composed of the *radius* and *ulna*; among horsemen, called the *arm* and *elbow* (*vide f, r*), which are so intimately united in the old horse as to be by some, and without any great impropriety, described as one bone*. The *radius* is a long cylindrical bone, with a body and two nearly equal extremities. The superior is flat, and receives into articular depressions the condyles of the humerus; it has anteriorly tuberosities for the attachment of muscles, and posteriorly an articulating surface for the ulna. Its body is slightly convex anteriorly, and its inferior extremity is furnished with four eminences; covered, as is common with articular surfaces, with cartilage, and articulating with the first bones of the carpus or knee. The anterior part of this extremity is depressed with three sinuosities, receiving the tendons of the extensor muscles of the foot. It is observed in all animals intended for speed, that the length of this bone is very considerable. In the hare and greyhound, the knee is but a very small distance from the ground; and a long canon is found equally favourable to quick motion in the horse, and by good judges is always preferred. The parts below the knee appear to be bent in progression, to receive the weight of the machine, but not to add to the extent of its progress; and hence as this is effected by the parts above, the longer they are the better. It must likewise appear, that the shortness of the parts below must be favourable to strength, though it possibly detracts something from the ease and rebound of the spring; and hence amateurs in the manege, always choose a short arm as better adapted to the cadences taught by that art. The *ulna* is articulated at the posterior and superior part of the radius with intervening cartilages, and strong ligamentous fibres; it then passes downwards (see *Skeleton*) unattached, permitting vessels to pass between, till it has reached the middle of the radius, when it terminates in a point, which is likewise attached by ligamentous fibres. As the horse advances towards age, the intermediate cartilages become absorbed, and bony fibres thrown out, which form an inseparable union between them. The ulna stretches out superiorly into a process covered with cartilage, and is received into the great posterior fossa

* Bourgelat describes the radius and ulna as one bone, under the name of cubitus. La Fosse speaks of them as two bones, radius and cubitus. Cubitus in authors is sometimes applied to either bone, because in the human these bones are nearly of a length, and not far distant from the measure of a cubit; but as this will not apply to either of these bones in the horse, the term ought to be rejected entirely.

of the humerus; from which the whole extends backwards to form the olecranon, whose whole surface is rough for the insertion of the strong extensor muscles of the fore arm. On the slightest inspection of the skeleton, it will appear how much the motions of the fore extremity must depend on the length and obliquity of this process; which acting on the principle of a lever in the extension of the arm, must necessarily, as it is long or short, make all the difference between a long and a short purchase. This bone likewise serves to keep up an equilibrium between the flexor and extensor muscles. The ulna and radius are articulated with the humerus, by a very extensive capsular ligament stretching from the anterior part of the humerus, circumscribing its condyles and the whole of the posterior cavity, and inserted into the radius and ulna; taking in the whole articular surface. It is strengthened in its articulation by an external and internal ligament, extended from the condyles of the humerus over the head of the radius, and likewise by the tendinous and aponeurotic expansions spread over the whole, by which this joint is wholly prevented from dislocation; but the olecranon has been found at times fractured, and I have understood that a horse belonging to the Veterinary College travelled many miles after it had happened. From the great strength of the muscles implanted into it, a proper and complete reduction of the fractured extremities would be extremely difficult. Punctured wounds have sometimes happened in this part, when if motion has been kept up, a large quantity of air has been absorbed, forming extensive emphysema.

The *carpus* or *knee* is composed of seven bones, which are very irregular in their figure, with numerous articulating surfaces covered with cartilage; internally they are spongy, and externally uneven, for the attachment of numerous ligaments. They are placed in two rows, the uppermost of which contains three bones articulating with the inferior extremity of the radius; and a fourth without the row, which is attached to the posterior part of the radius, and of this first row. The second row is likewise composed of three bones, and articulates with the large and small metacarpals. The *scaphoid* is the first bone of the upper row on the inner side (*vide* 2, 2), and articulates with the internal condyle of the radius anteriorly, and laterally with the lunare; so that the scaphoid and lunare are placed over the magnum in front of the knee, as in building, two bricks are placed so that their line of division is over the centre of a third, by which means great strength is given to this articulation; it likewise articulates inferiorly with the trapezoid. The *lunare* is the second bone of this row (*vide* 3, 3), articulating above with the middle and anterior part of the radius, below with the magnum and cuneiform, and laterally with the scaphoid and unciform, and by a small posterior point to the pisiform. The *naciform* is the outer bone of the first row (*vide* 4), and articulates above with the external condyle of the radius; posteriorly with the pisiform; below with the cuneiform, and laterally with the lunare. The *pisiform* (*vide* 1, 1) projects posteriorly on the outer side of

the superior row, so as to give a greater power of attachment to muscles, and to raise the ligaments of the knee from compressing the tendons. It articulates with the outer and posterior part of the radius by one surface, and by another to the unciform. The *trapezoid* (*vide* 7) is the first bone on the inner side of the second row, and is situated at the posterior lateral internal part of the knee, articulating above with the scaphoid, below with the internal small metacarpal, and a small part of the canon, and laterally with the magnum. The *magnum* is the middle bone of the second row (*vide* 5, 5), and is the largest of the whole; receiving above the scaphoid and lunare, and resting below on nearly the whole of the surface of the large metacarpal or canon; articulating at the lateral internal with the trapezoid, and at the lateral external with the next bone. The third and most external of the second row is the *cuneiform* (*vide* 6); it rests upon the external small metacarpal, and in part upon the great metacarpal; and articulates above with the unciform, and laterally with the magnum *. The carpal bones are covered with cartilage on their articular surfaces, and their non-articular are rough for ligamentary attachment, by which the whole are very closely connected together, allowing but little motion between any but the first and second row; yet some little is allowed between the whole, by which the jar is taken off when the limb approximates the ground. The capsular is a very extensive carpal ligament, arising from the inferior extremity of the radius; it passes to the first row of bones, to which it is attached; it then proceeds more loosely to the second; from whence it is continued on, investing the superior extremities of the large and small metacarpals. Within this, is secreted a large quantity of synovia or joint oil; and it is the escape of this, and the penetration of the cavity of the joint, that makes deep wounds of the knee so dangerous. There are also several layers of ligamentous fibres, some of which are applied to the bones; others are more loose, and stretch over the tendons to form annular bands. Each bone likewise has individual fibres connecting it to the bones with which it is attached, forming on the whole a most complex ligamentary plan, greatly strengthening the knee joint, and preventing a possibility of dislocation.

The *metacarpus* (*vide t, t*), or what is termed the *canon* or *shank*, is formed of a large metacarpal bone and two small ones, which the French term styloids or perones. The *canon* is a plain cylindrical bone with its two extremities rather enlarged; the superior, articulating with the second row of the knee, has little correspondent risings and depressions for those bones. Anteriorly its head forms a tuberosity encircling the bone; posteriorly this is indented into two surfaces, receiving the small metacarpals. Its inferior surface is formed into two condyles, divided by an eminence, and articulating

* Hardly any two authors agree in the names of these bones; the French differ most essentially from each other. Bourgelat simply says there are nine bones, which is two more than exist; but he does not attempt to name them.

with the pastern and sessamoids. The small *metacarpals (vide u, u)* are one on each side, each having a superior articulating surface uniting it with the carpal bones; each has likewise a surface of attachment with the canon at its superior part, having a cartilaginous lining for this purpose, and being tied in its situation by ligamentous fibres. They then pass tapering down less closely united, nearly two thirds of the length of the bone, when they terminate by an unattached point or little button.

The small metacarpals are attached by a large aponeurotic expansion, which will be described with the extremities; but they are immediately connected with the large metacarpal bone by strong appropriate ligamentous fibres; yet not so closely but that they have some motion, and hence can descend when pressed upon by the bones of the knee; and which appears one of their principal uses. The internal receives the weight of the trapezoid, the external receives part of the pressure of the cuneiform, and hence the spring in action can be wonderfully increased. But as the animal grows old, and his exertions become greater than his strength, so nature, sympathising with the general weakness, unites these bones by throwing out osseous matter between them; by which means, though their union becomes consolidated, their spring is lost; for in old horses these bones are almost always united closely to the canon. In young horses also, from the deposit being greater than the absorption, so there is often a very considerable quantity of bony matter thrown out, and which forms what we term splent. As it is usual to raise the outer heel of the shoe, by which means the weight must be thrown on the inner small metacarpal; this has been thought to be the reason why splent appears usually on the inner side; but perhaps this will not wholly account for this partiality to one side more than the other. There is more reason to believe that the natural form of the parts gives a tendency to this also; for we find that the weight of the carpal bone pressing on the outer small metacarpal, is divided between it and the canon; but the internal receives nearly the whole weight of the trapezoid.

The *pastern.* The rest of the extremity from below the canon consists of one phalange *, composed of four bones, with two additional small sessamoids at the fetlock joint. The *sessamoids (vide w, w)* are two small bones exactly opposed to, and articulated with, the posterior surface of the superior part of the pastern bone, and the inferior part of the canon. They are situated side by side, and each has a cartilaginous concave surface articulating with the

* The more we view the series of animated existence, the more we are led to admire that wonderful harmony throughout, which allows of no breaks or disjointure. Man has numerous phalanges. The monkey tribe, with cats, dogs, and many others, have likewise as many; but they degenerate: the thumb of the monkey is but an imperfect antagonist to his fingers, while the fifth or dew claw of dogs and cats is still less useful. From these we descend to the cloven-footed tribes, who have only two perfect phalanges, and two imperfect. In the solipede there is but one phalange, but, that the connexion might not be lost, there is, as we have shewn, two imperfect metacarpals.

rest, rather rounded, and are firmly attached in their situation by ligaments, the principal of which is the suspensory. They appear to act as a spring, and they also throw the tendon of the foot which slides over them, farther from the centre of motion. The *pastern* or *first phalange* (*vide v*, *v*) is situated obliquely forward, and upon which obliquity, depends the ease and elasticity of the motion of the animal: nevertheless, when too long, it requires too great an effort in the tendinous and ligamentous parts to preserve it in its situation; and thence long jointed horses are more liable to become strained. The superior surface of the bone receives the greater part of the inferior surface of the canon; its posterior upper part articulating with the sessamoids, and its inferior with the coronet or small pastern. It has in front a rising portion, which, continued through the upper part, divides it into two articulary depressions; the body is much smaller than either end, particularly than the upper. The inferior extremity ends in two rounded articulating protuberances. It has a capsular ligament at each extremity, with lateral fibres strengthening the articulation; the suspensory is likewise continued on it, by all which means it becomes firmly articulated.

The *lesser pastern* or *coronet bone* receives the great pastern, and is peculiar in having its largest extremity below; it presents an inferior, an anterior, and posterior surface; but cannot be said to be square (*vide x*, *x*). Its anterior eminence is received into the anterior inferior depression of the pastern; and posteriorly the upper surface is formed into two depressions, receiving the pulley-like surface of the pastern. Inferiorly it terminates in two similar pulley-like surfaces, and an anterior depression corresponding with the anterior eminence of the coffin bone. It likewise articulates with the navicular bone, which has two depressions receiving its prominences when this joint is fully extended. This bone at its upper extremity receives the capsular ligament of the pastern, as well as strong ligamentous fibres on each side: inferiorly, besides its capsular, it receives the ligaments of the navicular bone, as well as its appropriate ligamentary junction with the coffin.

The *coffin bone* is a very peculiar one, and forms the third phalange (*vide y*). It corresponds in shape to the hoof of the horse, which, with its appendages, it fills. It is very porous, with its bony fibres perpendicularly placed so as to give it a rough linear appearance, particularly at the lower part. When viewed in front, an eminence is seen at the upper part to which the tendon is attached: the lateral parts are not so high, but project farther back, and form two lateral processes, but which are not always distinct. In the lower of these processes, or between, is usually a considerable branch of an artery passing from the posterior part, and which reaches round two thirds of the semidiameter of the bone, and then ramifies within it and the laminæ. There is likewise usually a lower lateral groove, from which a branch of this upper trunk passes to the under surface of the bone. Above these processes is a concavity which receives the lateral cartilages of the foot, and gives attachment

to the capsular ligament. Round this outer surface of the bone are attached the sensible laminæ. The inferior surface has two concavities; the anterior has no foraminæ, and to it the sensible sole is attached: the posterior appears hollowed out of this, and presents a rising line shewing the extent of attachment of the flexor tendon; on this surface two grooves that lodge two considerable arteries appear; and to this concavity, under the flexor tendon, ligaments are attached. The upper surface of this bone has two articular depressions divided by a rising line continued from the anterior eminence, and which are covered with articular cartilages. *See Plate* IX, *where this bone is represented.*

The *navicular*, *nut*, or *shuttle bone*, is situated at the posterior part of the coffin, so that its upper surface forms a continuation of the articulating surface of that bone; receiving jointly the broad extremity of the little pastern; having two depressions and a rising, corresponding with similar ones in the coffin. It is, as it were, laid upon the flexor tendon, which passes up over its posterior edge (*vide Plate* IX). These parts will be more particularly considered when describing the feet.

The Posterior Extremities.

These differ much from the anterior, not only in the strength of the parts, but in the length and direction of the bones forming them.

The *femur*, or *thigh bone*, is the largest in the body. From its upper extremity proceeds, in an oblique direction, the cervix (*vide k*), to which the rounded head is attached, articulating with the acetabulum of the pelvis. Within this head is a cavity, giving origin to a flat ligament, though improperly termed round, which is implanted in the acetabulum, and thus retains the head of the thigh very strongly in its situation: below the head is a ridge for the insertion of the capsular ligament; and from the inner part of the cervix a ridge extends down, in the middle of which is a rising (*vide l*), called the *internal trochanter*. On a line with the caput or head, is a large depression receiving the tendons inserted into it. From this, the bone is stretched up into a very tall epiphysis (*vide i*), called its *great trochanter;* which is curved forward, and serves for the attachment of the gluteus maximus: below, there is a very considerable tuberosity, that may be called the tuberosity of the great trochanter. Behind this trochanter there is a considerable cavity, into which the muscles are inserted: below which again, there is on the outer side another process called the *lateral external trochanter* (*vide l*). The body has two flattened surfaces, one situated posteriorly, the other at the lateral and external part: usually about the middle, is a foramen for the transmission of the medullary vessels. Its inferior extremity terminates in four condyles. The anterior unite to form a surface on which the patella slides (*vide m, m*): the posterior (*vide n, n*) have a cavity behind them in which the crural vessels pass protected, surrounded by fatty substance. The femur is not, as in

the human, curved outward, but is straight in its body, though oblique in its direction, being carried forward, so that the patella falls within the line of the haunch. The upper extremity articulating with the pelvis is called the *whirl* or *round bone* by farriers; and is held in its situation by the flattened ligament we have described, and by a strong capsular one, as well as by the large muscles surrounding the joint: nevertheless, it is now and then dislocated; though a violence of such magnitude more usually fractures the head from the neck of the bone.

The *patella* is called by farriers the *stifle;* it is nearly angular, and has an anterior rough concave surface to which ligaments are attached, and an interior which is cartilaginous, adapted to the convexity of the femur and tibia. The patella has some of the tendons of the strongest muscles of the thigh inserted into it; and which are from thence continued over to the tibia. This bone must thus greatly assist the motions of the leg, and give these muscles much power. It is attached in its situation by the strong muscles implanted into it above, and a ligament from its lower part, united with an expansion of the rectus tendon stretched over and fixed into the depression at the head of the tibia.

The *tibia* is a large bone situated within that part called the thigh, though, speaking with analogy to the human, it is properly the leg (*vide q, q*). It is formed of a large epiphysis called its head, and a small attached pyramidal part called the fibula (*vide r, r*); with another epiphysis forming its lower extremity, furnished with articulating protuberances termed malleoli. This bone is placed obliquely backward, as the femur is obliquely forward; forming with that bone an obtuse angle. The superior extremity has an anterior flat protuberant surface receiving the patella in the flexions of the limb, and having ligaments inserted into it: it has likewise an upper surface with two slight articular fossæ separated by a rising edge, which enters between the condyles of the femur. On this likewise the semilunar cartilages are placed (*vide p, p*), and in a hollow formed for this purpose, are lodged the cervical ligaments of this joint; and behind run the popliteal vessels in an appropriate cavity surrounded by fat. The body is nearly triangular, the anterior angle of which is called its spine, and forms the human shin; and on this body is seen a foramen for the transmission of the medullary vessels. The inferior extremity is formed into three considerable protuberances, and a lesser one, corresponding with the pulley-like surface of the astragalus; the risings of the one being received into the depressions of the other, so as to form the strongest possible articulation.

The *fibula* in the horse appears nothing more than an epiphysis to the former bone, uniting with it by age; and seems more designed to keep up that beautiful connexion we observe throughout animated nature, than for any great use in the machine. It is attached by a cartilaginous surface to the lateral superior and posterior part of the tibia, with its base upwards and its point directed

below (*vide r, r*) ; reaching a quarter of the length of the tibia, to which its lower point is attached.

The articulation of the tibia with the femur is by a glenoid cavity, consequently this joint requires strong ligaments, or a dislocation might take place; which on a superficial observation one might deem probable: but so perfect is the mechanism of this joint, that I never heard of an instance of it. The *semilunar cartilages* of this joint, by being thick on the outside and thin in the middle, give some depth to this otherwise superficial joint; but the principal strength of the articulation is derived from its ligaments, which are a capsular, lateral, and crucial. The capsular is extensive, and completely invests both extremities of the bones forming the joint. The crucial ligaments arise within a depression in the articular surface of the tibia, which crossing each other are inserted into the posterior part of the condyles of the femur. The lateral ligaments are an external and internal, arising from the condyles of the femur, and inserted into the head of the tibia.

The *tarsus* or *hock* is, in the horse, an assemblage of six bones (*vide Skel.*), forming a most complex and important joint; and so intimately united as to appear but one bone, allowing but little motion between them; yet that little is useful in preventing jar and concussion: and likewise by having such numerous points of contact it is rendered stronger. The human tarsus is composed of seven bones; and as in man this part was to be opposed to the ground, so it is in him arched inferiorly, to give it greater firmness and more spring: that which forms the point of the human heel constitutes the point of the hock in the horse.

The *astragalus* is the largest of these bones, and of a most irregular figure (*vide* 3, 4. 3, 4). Its upper and anterior surface is pulley-like, having two remarkable circular risings with an intermediate depression, which articulate with the malleoli of the tibia. Posteriorly it has several surfaces of attachment with the calcis, receiving the eminences of that bone into considerable depressions: inferiorly it has similar surfaces for articulation with the great cuneiform, upon which it rests; and posteriorly at the lateral external part it has a surface of attachment with the cuboid. The *calcaneum* (*vide* 1, 2. 1, 2) is placed posteriorly from the centre of the joint, into which the tendo achilles, or twisted tendons of the gastrocnemii muscles, are inserted: the longer therefore is this process, the longer lever these muscles have to act by; and a very slight increase or diminution in its length, must make a very great difference in the power by which the motions of the joint are operated. It is by this tendon, that when the animal has inclined the angle between the canon and the tibia, or, in other words, when his hinder extremities are bent under him in a gallop, or one of them in the trot, that he is enabled again to open it. The calcaneum is not placed so as to rise exactly from the centre of the joint, but rather externally; and this leaves a space on the inner side, by which the flexor tendons of the foot, with the vessels and nerves pass protected from pressure:

inferiorly it articulates by a concave cartilaginous surface with the cuboides, and anteriorly it is received into the depressions of the astragalus. The other four bones are more wedge-like, and only serve to increase the surface of attachment; one of them is called os cuboides, the other three cuneiform. *Cuneiform magnum* (*vide* 5, 5), or great wedge like, is placed under the astragalus, articulating with it by a concave, and inferiorly by a convex surface, resting upon the middle wedge like: posteriorly its internal, as well as part of its inferior surface, articulates with the cuboid, which Mr. Stubbs calls navicular; it has likewise posteriorly and inferiorly a small surface of attachment with the little cuneiform. Immediately behind this, on the outer side appears the *cuboid* (*vide* 6): by its cartilaginous surface it articulates, superiorly, with the inferior concave surface of the calcaneum, receiving the inferior posterior edge of the astragalus, and resting inferiorly on the external small metacarpal bone, and part of the canon: it has likewise two surfaces of attachment with the cuneiform magnum, and one with the medium. The *cuneiform parvum* (*vide* 8) is situated most posteriorly on the inner side, immediately under the posterior internal part of the cuneiform magnum, and over the internal small metacarpal bone. It articulates by a small upper surface with the next bone, projecting rather forward, to rest partly on the canon; but its principal portions articulate with the great cuneiform superiorly, and with the internal small metacarpal inferiorly.

The *cuneiform medium* (*vide* 7, 7). The greater part of this bone appears on the front of the hock, articulating by its superior cartilaginous surface with the great cuneiform, and inferiorly with the whole head of the canon, or great metatarsal. It is slightly triangular, with its acute part pointed posteriorly, and articulates by a posterior lateral internal surface with the cuneiform parvum, and at the lateral external part with the cuboid.

Though the bones of the hock have all cartilaginous surfaces, yet they have but little motion except between the tibia and astragalus, and this is confined to flexion and extension. Each of them has peculiar plans of fibres, stretching from one to the other in every direction, by which means they are individually joined together. The capsular ligament arises from the inferior extremity of the tibia, stretches backward to insert itself into the calcaneum behind, and before into the ridge of the canon; besides which, the lesser bones have also peculiar capsules. From the malleoli on each side, arises a strong common ligament extending laterally over the joint, firmly fixing itself to the bone in its passage: a plan of this forms likewise the annular ligaments, under which the tendons insinuate themselves in their passage. A short plan of strong fibres extends also from the inner and outer sides of the tibia into the astragalus; and likewise a very strong posterior one from the calcaneum passes over the cuboid and cuneiform medium, and, uniting with the small metacarpal and posterior part of the canon, covers all the back part of

the joint. It is the inflammation of this ligament that occasions curb.

This joint being so complex, renders it very liable to disease and derangement; and that more particularly in those horses who are naturally disposed to set themselves, or are taught to throw their weight on their haunches; for in them the greatest stress is then laid on this joint: whereas, in the mode of riding usually practised in England, the weight is more thrown on the shoulders and fore limbs; hence with us, these are the parts that generally first fail; but, in France, and the whole of what is called the Continent, where horses are taught to go much on their haunches, this joint is more liable to suffer.

The rest of the bones of the hinder extremities are similar in nature and number to those of the fore; nevertheless, there are some small varieties (*see Skel.*). The large metacarpal bone, or canon, is longer, and altogether larger than that of the anterior extremity; it is articulated above with the cuneiform medium, and in part with the cuneiform parvum and cuboides; and below with the pastern and sessamoids. The external small metacarpal is considerably larger than the internal, articulating superiorly with the cuboides, and laterally with the canon. The internal is less, articulating above with the little cuneiform, and laterally with the internal edge of the canon; in other respects they resemble the anterior.

The pastern, or first phalange, is longer than the anterior, and its situation less oblique: it resembles in other respects those before. The sessamoids are two, and do not differ from those already described. The coronary bone partakes of the form of the pastern, being likewise less oblique in its position, resting more on the coffin, and less on the navicular than in the front; thus, in the posterior coffin, the fossa of articulation is deeper; the reason of which appears to be, that as a horse has frequently to support the whole weight on his hinder extremities; so it was necessary that these bones should be opposed to each other more in a right line, whereby they acquire strength: the loss of elasticity occasioned by which, is made up by the formation of the hock: and, as in action, the natural inclination of the posterior extremities must be much under the animal, to gain the common centre of gravity; so, had these articulations been equally oblique as those before, the navicular bone would have been too much pressed upon: add to which, that in throwing a horse on his haunches, his fetlocks would have been brought to the ground; but in the present formation, the bony pillar takes off much of that stress that would have otherwise been forced upon the tendons.

Of the Skeleton, considered mechanically.

It is evident, that the progression of animals depends principally on the form and direction of the parts forming the base of the machine; and we shall find that the mechanical structure of the skeleton is admirably adapted for giving ease and celerity to motion.

The horse presents a quadrilateral figure, with four supporting pillars to an inclined cylinder *, which is not placed in equal lengths upon these supports, but has the head and neck projected forwards; which is again counterpoised by the additional weight in the hinder parts, so as to leave the line of direction still near the centre of the whole. The length of a cylinder may be such as not to support its own weight; nature has, therefore, wisely limited the length of the spine in animals, and their general growth: hence, *cæteris paribus*, a short backed horse must be stronger than a long one; it is likewise upon this mechanical principle, that smaller animals can carry proportionably more than larger. In the bony pillars forming the legs, scarcely any of the bones are perpendicularly opposed to each other; yet it will be found, that a perpendicular from their common centre of gravity, falls nearly in their common base: by which means they are supported as firmly as though their individual axes had been in a line perpendicular to the horizon. Had they been perpendicularly opposed to each other, there could have been but little ease or quickness in motion; every exertion would have been a jar, and every increased effort a luxation or fracture. This deviation from an upright position in the bones, must necessarily, however, have powers to correct it, which is done by muscles; and wherever the angles are found greatest, the muscles will be found strongest. This muscular exertion to counterbalance the angular inclination, occasions fatigue, which is the reason why one posture continued for a length of time gives a sense of pain: the set of muscles immediately engaged becoming weary, the animal is obliged to call another set into play; which change is necessarily more or less frequent, as the animal is weaker or stronger. The extent, therefore, of the action of parts, is the produce of their length, direction, and the different angles they are capable of forming; the force arises from the direction, in combination with the agency of the muscles. The repetition of the action is dependent on the muscles alone; but as the original action arose out of the length and direction of the parts; so it will be evident, that in every subsequent repetition, it will be more or less extensive, as these were more or less perfect in their formation, even though the muscular exertions should be the same: hence some strong animals cannot move so fast as weaker ones, as the cart horse and racer, or the greyhound and mastiff. The power of muscles is increased or diminished as they are situated near or more distant from the centre of motion: thus, the bones are usually so placed, as to give the muscles this advantageous position; some are formed into angles, as the femur and tibia; others into processes, as the olecranon, calcaneum, &c. Every change in the position of a body must occasion a similar one in the centre of gravity: in order to pre-

* The human is a perpendicular body, supported by two pillars; the spine of which appears as two pyramids joined into one common base; and though no where straight, is so ingeniously contrived, that a perpendicular from their common centre of gravity falls into their common base. The human, by this alteration in position, becomes a much more complex machine, than the brute.

serve which, the feet are changed to form a new centre for the moving machine, which forms what is termed progression; the different modes of conducting which, and the degrees of celerity of, are called *paces*. —*See Paces.*

Sect. IX.

SYNDESMOLOGY

COMPREHENDS all the appendages to bone, as the *cartilages, periosteum, medulla, ligaments,* and *synovia.*

Cartilages may be divided into three kinds; *articular, nonarticular,* and *temporary.* Considered generally, cartilage is a smooth, white, solid, uniform, elastic substance, harder than most other parts, but less so than bone, with little vascularity; and having a membrane reflected over it called *perichondrium.*

Articular cartilages are solid and but little vascular: there is usually a layer or tip of them on the extremity of every bone intended for motion; by which they slide easily on one another, by their flexibility accommodating themselves to the various figures necessary in different motions; and by their elasticity preventing the effects of that concussion, which must otherwise take place between two inelastic bodies.

The *nonarticular cartilages* are but little vascular, and are divided into the attached and unattached. The *attached* are placed on the ends of bones not articulated, as the spine of the ilium, sides of the foot, ends of the sternum, supercilia of cavities, as the cotyloid of the scapula. They are likewise interposed between bones immoveably joined, as the symphysis pubis; those between the bodies of the vertebræ are of a mixed nature of ligament and cartilage, and those likewise between the ilium and sacrum. The cartilages of the ribs are of great use to give flexibility to parts that otherwise have but little. The septum narium is an instance of attached nonarticular cartilage, of great use, serving the purpose of bone. The *unattached* are such as sustain parts in the place of bone, without being immediately any part of a bone; those of the ears are a familiar instance; the cartilages of the larynx likewise form another.

The *temporary cartilages* are those of which the ends of bones are formed in young animals, being very vascular, that they may be easily absorbed, and bone formed in their room. The description of individual cartilages will appear in the progress of the work, therefore we shall not particularize them here.

The *periosteum* is a general investing membrane to bones and their appendages, which receives different names as it covers different parts; that investing the skull being called *pericranium;* that stretched over cartilages, *perichondrium;* and when it covers ligaments, *perides mium.*

The use of the periosteum generally, appears that of furnishing bones with their vessels, thereby tending to their formation. It has only a small proportion of nerves, yet becomes under inflammation highly sensible.

The *marrow* is a soft fatty substance, deposited in the cavities of the bones, particularly in the long ones, where it exists in considerable masses within the internal membrane, which is sustained by the cancelli of the bones. This fatty matter is secreted from large arteries, called medullary.

Ligaments are necessary to bones, as a firm connecting substance uniting them to each other, yet flexible to allow intermediate motion. Ligament is likewise a common membrane in every part of the body, but is more particularly appropriate to bones, and is usually described with them. They are generally inelastic; however, there are some exceptions; as the cervical, and those of the metacarpal and metatarsal bones. They appear formed of strong whitish fibres, and may be generally divided into connecting and capsular. The *connecting* have endless varieties in regard to their form, strength, situation, &c. They are usually found stretched from one bone to another, or from one soft part to another.

Some ligaments partake of the nature of cartilage, and are hence called cartilaginous ligaments, being hard, and but little vascular.

The *suspensory ligaments* suspend parts, as that of the acetabulum, those of the liver connecting it to the diaphragm, &c. The proper, are those immediately articulating bones.

The *capsular ligaments* are those that usually surround the two ends of articulated bones, and form a complete cavity within, called the cavity of the joint; and it is the forming of a cavity that appears the principal use of this ligament, for it is usually of some length, frequently of no great thickness; but always impervious. This kind of ligament is not very sensible without, but very sensible and vascular within; secreting from the inner surface a mucus called synovia. It is from the sensibility of this inner surface, that such great inflammation is produced as is usually attendant on wounds into the cavity of a joint: from the escape of the synovia, the whole surface of the joint, which is very large when expanded, suffers attrition, and becomes irritated and inflamed to the highest degree. The opening in these cases should, therefore, be immediately closed, to prevent these effects. (*See wounds in joints.*) I have omitted particularizing the individual ligaments of the body, as I have chosen to describe them with the parts they belong to.

The *synovia* is a mucilaginous substance, secreted, as we have shewn, by the inner surface of the capsular ligaments, which are for that purpose very vascular. Its use is very great; without it, the attrition between the articulated ends of bones would most painfully prevent motion; but by this slippery medium they slide easily over each other. This fluid may be secreted in undue quantities, and then forms capsular dropsy, which is not however frequent in the horse.

Sect. X.

MYOLOGY.

MUSCLE is that part in an animal we term flesh, in distinction from skin, gristle, bones, &c.; and the phenomena it exhibits are so universal, that it is probable it exists in every animal, though we are not so easily able to detect it in some as in others. Muscles appear composed of reddish bundles of fibres laid alongside of each other, divisible into lesser fibrillæ of the same figure, but the ultimate division of which it is impossible to trace. When these bundles are connected together into a determinate form and circumscribed extent, it is called a muscle: and as the motions of an animal are very various, and the circumstances under which they are brought about equally so; the peculiar shape these motive masses take on, is as varied. Muscular fibre is spread over the body, and it has been very judiciously remarked, that our ideas of it are probably too much limited: thus, it constitutes a principal part of all the viscera, and enters into the composition, it is probable, of many membranes. But what is more generally understood by a muscle, is a distinct body, having its determinate parts.

To the generality of muscles, particularly to those ending in bones, is another part added of a very different texture, called a *tendon;* which is an insensible, inelastic, fibrous substance. When this is extended into a thin expansion, it is called *aponeurosis*. The size of the tendons is not proportionate to that of the muscles they belong to, and some are altogether without any: but in the long ones, flexing and extending the joints, their presence is highly advantageous; for the size of the termination is thereby diminished without the strength being decreased, and the parts they move over, are left free for motion. Tendons are not very vascular, nor can we easily detect any nerves in them; their powers of life are consequently small, and from being so little vascular are hardly putrefactive, and with difficulty slough; nor are they at all sensible, but the membrane covering them is very highly so under inflammation. A divided tendon, nevertheless, both in an ass and dog, has reunited, and a rupture of the tendon achilles in man has also done the same. The vascularity of muscular substance in general is extreme, their whole colour being derived from the quantity of blood within them, and their ultimate powers also: for when deprived of a part of their blood, they become weak; if it is wholly lost, they wither and die. Muscles acquire a power of acting, dependent on their situation, and according to their fixed point; and as these points can be altered by the muscle itself, its actions become very various, of which diversity, some by the complexity of their structure appear to be more capable than others. In consequence of the large quantity of nerves

and blood vessels they possess, their living powers are very great. They have the general living powers of all other parts in a high degree; and, besides which, they own a power peculiar to themselves, whereby they contract and shorten at pleasure. This power is dependent on the will, in the *voluntary* muscles, and in the *involuntary* on appropriate stimuli, as blood stimulates the heart, and light the iris. The contractile power of these motive organs, has been for ages a subject of wonder and dispute: this disposition to be acted upon by stimuli has been called their *irritability*, and exists after death; and likewise remains in the muscles on their removal from the body, whence it must be inherent in them. If, however, the nerves going to voluntary muscles are tied, we lose our power over them, they become paralytic, and incapable of obeying the commands of the will; hence it would appear, that nervous influence is the proper stimulus to voluntary muscles.

Muscles are called voluntary and involuntary. *Voluntary muscles* are such as are immediately under the influence of the will, as those of the arms, legs, eyes, mouth, &c. *Involuntary muscles*, are such as are not under our guidance, and whose functions go on without controul, as the heart, the respiratory and digestive muscles. Voluntary muscles have usually antagonists, whereby the perpetual tendency to contraction is counterbalanced: they are likewise commonly invested by a cellular or membranous covering, which in some instances is very dense, called *fascia*, whereby they are bound down and assisted in their action. The tendons also in most cases have a *theca*, or sheath, surrounding them, by which they are prevented from rising during action, and by which, from having a fluid interposed, the effects of friction are prevented. At their extremities there is usually a tendinous *capsule*, containing a quantity of mucus, an increased collection of which forms what is termed windgall.

The accurate description of organs so complex and numerous as the muscles, is by no means an easy task; particularly in an animal, whose anatomy has but lately made any progress among us. I have dissected much, and paid considerable attention to the muscles in general; but as I considered those of the extremities as of more consequence than those of other parts, they attracted most of my notice: and though I have gone over the others, yet not perhaps with that perfect correctness, necessary to class, divide, and name them arbitrarily, as I have those of the extremities. I will not run any chance of palming error therefore on the student, by giving a mutilated myology; but will, at once, present Bourgelat's division and nomenclature of the muscles of the head and trunk; reserving to myself the liberty (which, it will be observed, I have very frequently taken) of correcting in the notes what I conceive to be erroneous. By this means, I hope, that the table of muscles will

be, at least, more perfect than any plan yet made public: at the same time, I must remark, that, particularly in this branch of anatomy, this celebrated author is usually very correct; and I would recommend his elementary work to every pupil beginning dissection. I may here add, that I would not advise any student, who dissects the muscles, to trouble himself with references to numerous authors, or he will probably, what with different nomenclatures, a variety in the mode of description, and perhaps the division of one muscle into two or three portions, become so bewildered as to turn with disgust from the rugged task: but I would recommend the student, if at all advanced in anatomy, and alert in the process of dissection, to make use of no reference, but carefully to mark every muscle with its origin, attachment, insertion, with his own ideas of the uses, and afterwards to compare this with the authors most to be depended upon.

When the muscles are single, that is, where there is only one muscle of that kind in the body, I shall mark it with a star in front; therefore, whenever this does not appear, the muscle described is to be considered as one having a fellow, or one muscle of a pair. It will be also observed, that, where Bourgelat's appellation is grossly erroneous, or uncharacteristic; I have added what would be a more appropriate distinction consistent with the human myology: and as it will be evident I have been studious to get much matter into the least possible room, so, instead of the words Origin, Insertion, Use, of the muscles, I have used the initials only, as *O*, *I*, *U*, placed to characterize the Origin, Insertion, and Use.

Muscles of the external Ear *.*

First.—*Origin.* From the superior part of the skull at the spine of the occipital, parietal, and frontal bones.—*Insertion.* Into the side of the ear.—*Use.* To draw the ears together.

Second.—*O.* At the spine of the occipital bone.—*I.* The base of the ear.—*U.* Assists the first.

Third.—*O.* At the posterior part of the same bone.—*I.* The posterior part of the base of the ear.—*U.* Draws the ear backwards.

Fourth.—*O.* Below the preceding.—*I.* The most inferior part of the ear.—*U.* Draws the ear outwards and downwards.

Fifth.—*O.* By a thin expansion from the parotid gland.—*I.* At the anterior part of the base of the ear.—*U.* Draws the ear forward and outward.

Sixth.—*O.* At the internal part of thecartilage situated in front of the ear.—*I.* At the posterior and inferior part of its base.—*U.* Draws the ear backwards, and assists the second.

* These muscles, it is evident, are very improperly named by Bourgelat, as thereby their uses are not characterised. The student will readily detect their uses, and name them accordingly. This division of Monsieur B—'s may be also questioned.

The Muscles of the internal Ear are four; three to the Malleus and one to the Stirrup.

*First**.—*O.* At the superior part of the bony meatus.—*I.* Into the handle of the malleus.—*U.* To draw the malleus forward, and to relax the tympanum.

Second†.—*O.* External part of the eustachian cavity.—*I.* Long process of the malleus.—*U.* To lighten the membrana tympani.

Third.—*O.* Internal part of the eustachian cavity.—*I.* Base of the long process of the malleus.—*U.* Assists the former.

Stapedius.—*O.* The petrous canal near the bottom of the cavity of the tympanum.—*I.* To the stapes.—*U.* To elevate the base of the stapes, and shut the oval opening.

Muscles of the Eyelids.

Orbicularis palpebrarum‡.—*O.* Around the internal surface of the skin of the eyelids.—*I.* By a tendon to the angular process.—*U.* To shut the eye.

Levator palpebra superioris.—*O.* Around the bottom of the orbit.—*I.* Into the superior part of the tarsus.—*U.* To open the eye.

Muscles of the Eye.

Levator oculi§. *Depressor oculi. Adductor oculi. Abductor oculi.*—*O.* From the bottom of the orbit.—*I.* The anterior part of the sclerotic coat, opposite to each other.—*U.* To draw the eye upwards, downwards, inwards, and outwards.

Obliquus major, seu trochlearis‖.—*O.* From the bottom of the orbit, passes through a pulley-like process.—*I.* Superior and anterior part of the globe.—*U.* To turn the eye on its axis, and carry it forwards and downwards.

*Obliquus minor***.—*O.* Near the ductus nasalis.—*I.* The back part of the eye.—*U.* Directs the eye forwards and upwards.

Orbicularis, or *retractor.*—*O.* From around the optic foramen, surrounds the optic nerve.—*I.* The posterior part of the cornea transparens.—*U.* To draw the eye into the orbit.

Muscles of the Lips.

**Orbicularis.*—*O.* Around the mouth, and thus forms a species of sphincter.—*U.* To shut the mouth and contract the lips, and likewise the nostrils.

External molar††.—*O.* Anterior part of coronoid process.—*I.* Inter-

* Laxator tympani.
† Tensor tympani.
‡ This muscle is very difficult to demonstrate without great care; it is commonly raised with the skin.
§ These muscles will be more fully explained when we treat of the eye.
‖ Obliquus superior.
** Obliquus inferior,
†† Buccinator.

nal membrane of the mouth.—*U.* Various actions of the lips and mouth.

*Internal molar**.—*O.* From the superior maxillary bone and posterior maxilla.—*I.* The commissure of the lips.—*U.* Operates jointly with the others, to elevate the angles of the mouth.

Cutaneous.—*O.* From the external surface of the masseter muscle by an aponeurosis.—*I.* By two portions to the commissure of the lips.—*U.* Assists in elevating the mouth.

Levator†.—*O.* Below the orbit near the junction of the angular, maxillary, and malar bones.—*I.* By an aponeurosis uniting with its fellow into the anterior part of the upper lip.—*U.* To raise the lip.

Maxillary‡.—*O.* From the maxilla superior and angular bone, below the preceding.—*I.* By two portions to the angle and anterior part of the upper lip.—*U.* Assists the former.

Middle anterior§.—*O.* From the alveolary edge at the upper incisive teeth.—*I.* In the upper lip.—*U.* To depress the lip.

Levator inferioris‖.—*O.* At the external part of the posterior jaw near the molar teeth.—*I.* In the skin of the chin.—*U.* To elevate the under lip.

*Middle posterior***.—*O.* The alveolary edge of the under incisive teeth.—*I.* In the lower lip.—*U.* To depress the lip.

Muscles of the Nose.

Transversal.—*O.* From the nasal spine.—*I.* To all the cartilage forming the nose.

Pyramidal.—*O.* By a thin expansion, from the middle and external part of the superior maxillary bone.—*I.* To all the external circumference of the nostrils.

Brevis.—*O.* From the lateral external part of the nose.—*I.* Into the skin of the false nasal fossa.

Cutaneous.—*O.* By the groove at the anterior edge of the maxillary bone.—*I.* Into the skin and false nasal fossa.—*U.* All these muscles operate in opening the nose.

Muscles of the Posterior Jaw.

Masseter.—*O.* From the maxillary and zygomatic spine.—*I.* At the external edge of the tuberosity of the posterior jaw.—*U.* To shut the jaw.

Crotaphite††.—*O.* From the frontal, parietal, and occipital bones; filling up the cavity called the eye-pits.—*I.* By a strong tendon to the coronoid process of the posterior jaw.—*U.* It assists the masseter.

* Levator anguli oris.
† Levator anguli oris.
‡ Pyramidalis, or second portion of levator labii superioris.—*Winslow.*
§ Depressor labii superioris.
‖ Levator labii inferioris.
** Depressor labii inferioris.
†† Temporalis. This muscle is covered by an aponeurosis arising from the bone above its origin, which serves to strengthen it.

Spheno maxillary.—*O.* From processes in the sphenoid and palatine bones.—*I.* To all the internal surface of the posterior jaw opposed to the masseter.—*U.* It acts with the former in contracting the jaws.

Stilo maxillary.—*O.* By strong attachment to the stiloid process of the occipital.—*I.* To the tuberosity of the jaw.—*U.* Draws the jaw backwards, and opens the mouth.

Digastric.—*O.* From the extremity of the above process.—*I.* To the inner surface of the jaw near its symphysis.—*U.* Acts in concert with the other.

Muscles proper to the Head performing its Motions.

Sterno maxillary.—*O.* From the point of the sternum.—*I.* To the tuberosity of the posterior maxilla.—*U.* Brings the head downwards, and assists in opening the mouth.

*Long flexor**.—*O.* By little tendons from the transverse processes of the 3d, 4th, and 5th cervical vetebræ.—*I.* To the cuneiform process of the occipital.

Little flexor.—*O.* From the lateral part of the body of the first cervical vetebra.—*I.* To the styloid process of the occipital.

Short flexor.—*O.* From the first cervical vetebra.—*I.* To behind the cuneiform process of the occipital.—*U.* These three muscles flex or bend the head.

Splenius.—*O.* From the spinous processes of the 2d, 3d, 4th, and 5th dorsal vertebræ; from the cervical ligament, and by another portion from the first five cervical vertebræ.—*I.* By an aponeurosis to the mastoid process.—*U.* To bring the head backwards.

Complexus major.—*O.* From the spinous processes of the 2d, 3d, and 4th dorsal vertebræ, to the first six transverse processes of the same, and the last five cervical vertebræ.—*I.* Into the transverse protuberance of the occipital bone.—*U.* To draw the head backward, and to one side.

Complexus minor†.—*O.* From the transverse processes of the 3d, 4th, and 5th cervical vertebræ, and by another part from the 6th, and 1st, of the back.—*I.* Into the mastoid process of the occipital.—*U.* To assist the former.

Rectus capitis major.—*O.* From the superior part of the spinous process of the 2d cervical vertebra.—*I.* To the posterior part of the occipital bone.—*U.* To move the head backward.

Rectus capitis minor.—*O.* From the 1st cervical vertebra, and the edge of the articular cavity.—*I.* To below the condyles of the occipital.—*U.* It assists the former.

Obliquus major‡.—*O.* From the spine of the 2d cervical vertebra.—*I.* To the transverse eminence of the first.—*U.* To draw the head backward, and rotate it.

Obliquus minor§.—*O.* From the transverse process of the 1st cervical

* Longus colli.

† Trachleo mastoidæus, or mastoidæus lateralis. It is divided into two parts; Bourgelat describes the lower with the complexus major.

‡ Obliquus capitis inferior.

§ Obliquus capitis superior.

vertebra.—*I.* To the lateral transverse eminence of the occipital.—*U.* To assist the former.

Muscles of the Os Hyoides.

Mylo hyoideus.—*O.* From the internal part of the posterior jaw.—*I.* To the appendix of the bone.

Genio hyoideus.—*O.* From the inferior part of the concavity of the jaw.—*I.* In the same manner with the preceding.—*U.* These two muscles bring this bone forwards, and depress it.

Sterno hyoideus.—*O.* From the point of the sternum.—*I.* To the anterior part of the body.

Hyoideus.*—*O.* From the internal surface of the little pectoral.—*I.* With the preceding.—*U.* These two muscles carry the os hyoides backwards.

Stylo hyoideus.—*O.* From the point or superior extremity of the long branches of this bone.—*I.* To the lateral part of its body, permitting the tendon of the digastric to pass through it.—*U.* Draws the body of the bone upwards and sideways.

Cerato-hyoideus.—*O.* From the little branches of the bone.—*I.* To the inferior part of its large branches.

**Arytænoideus transversus.*—*O.* From each side of the little branches of the bone, so that the fixed point is in the middle of the muscle.—*I.* To the inferior part of its large branches.—*U.* To draw the branches together.

Muscles of the Tongue.

Genio glossus.—*O.* From the inferior part of the concavity of the jaw.—*I.* To the base of the tongue.—*U.* To draw the tongue out of the mouth.

Basio glossus.—*O.* From the body of the os hyoides.—*I.* To the base of the tongue.—*U.* To draw the tongue inwards and backwards.

Hyoglossus.—*O.* From the external and inferior part of the grand branches.—*I.* To the base of the tongue.—*U.* To draw the tongue sideways and backwards.

Sterno thyroideus.—*O.* From the point of the sternum, dividing into two portions.—*I.* The anterior and lateral part of the thyroid cartilage.—*U.* Draws the larynx downwards.

Hyo-thyroideus.—*O.* From the lateral part of the body of the os hyoides.—*I.* To the edge of the thyroid cartilage.—*U.* Raises the larynx.

Crico-thyroideus.—*O.* From the lateral external part of the cricoid cartilage.—*I.* To the inferior edge of the thyroid cartilage.—*U.* To draw the thyroid and the cricoid cartilages together.

Crico arytænoideus posticus.—*O.* From the posterior surface of the cricoid cartilage.—*I.* To the inferior part of the arytenoid cartilage.—*U.* To dilate the glottis.

* This muscle should be coraco hyoidæus: it partly arises from the humerus, and has two insertions; one into the sphenoid bone, as well as one into the os hyoides.

Arytenoideus.—*O.* From the posterior part of the larynx, and from one arytenoid cartilage to the other.

Crico arytenoideus.—*O.* From the superior edge of the cricoid cartilage.—*I.* To the lateral external part of the arytenoid.

Thyreo arytænoideus.—*O.* From the internal and middle part of the thyroid cartilage.—*I.* To the lateral part of the arytenoid.—*U.* These three muscles shut the glottis.

Hyo-epiglottideus.—*O.* From the base of the appendix of the os hyoides.—*I.* To the convexity of the epiglottis.—*U.* It elevates the epiglottis, and dilates the glottis.

Muscles of the Pharynx.

Pterigo palato pharyngeus.—*O.* From the palatine and pteregoid processes of the sphenoid bone.—*I.* To the superior part of the pharynx.

Cerato pharyngeus.—*O.* From the internal part of the great branches of the hyoides.—*I.* To the pharynx below the preceding.—*U.* These muscles dilate the pharynx, drawing it from before backwards.

Hyo-pharyngeus.—*O.* From the lateral part of the body of the hyoides.—*I.* To the posterior part of the pharynx.

Thyreo pharyngeus.—*O.* From the thyroid cartilage.—*I.* To the posterior part of the pharynx.

Crico pharyngeus.—*O.* From the crycoid cartilage.—*I.* As above.—*U.* These three muscles straighten the pharynx by drawing the parts together.

Arytæno pharyngeus.—*O.* From the inferior part of the arytenoid cartilage.—*I.* In the pharynx.—*U.* It supports the pharynx.

*Œsophagus.—*O.* Arises and terminates in fleshy fibres on each side of the pharynx.—*U.* To shut the pharynx, and thereby facilitate the descent of the masticated bolus.

Muscles of the Velum Palati and Eustachian Cavity.

Perestaphelini externus *.—*O.* From the styloid process of the temporal bone, and eustachian cavity.—*I.* To the inferior part of the velum palati.

Perestaphelini internus.—*O.* Arises with the preceding.—*I.* With the above.—*U.* These muscles elevate the velum palati.

Velo palatine.—*O.* By a thin tendon to the palatine bones or their juncture.—*I.* Into the inferior and middle part of the velum palati.—*U.* This muscle assists the others.

Scalenus †.—*O.* By two portions; one considerable one from the external surface of the 1st rib, the other from the 4th, 5th, 6th, and 7th, transverse processes of the cervical vertebræ.—*I.* To the lateral anterior part of the bodies of the 7th, 6th, 5th, and 4th cervical vertebræ.—*U.* When the rib is the fixed point, it bends the neck; when the neck is fixed, it assists respiration.

* Circumflex, seu Tensor palati.

† The second portion of this in the human is the scalenus medius.

Flexor longus.—*O.* By numerous muscular fibres from the sixth dorsal to the first cervical vertebræ.—*I.* By a tendon common to the two muscles, to the middle and anterior eminence of the first vertebra of the neck.—*U.* This muscle bends the neck.

Transversalis longus.—*O.* From the transverse processes of the first dorsal, and the five last cervical vertebræ.—*I.* By a tendon which unites with that of the splenius and common muscle.—*U.* It bends both head and neck.

Transversalis brevis.—*O.* From the transverse processes of the five first vertebræ of the back by so many small tendons.—*I.* To the transverse processes of the last cervical vertebræ.—*U.* To extend the neck.

Spinatus longus.—*O.* The superior part of the spinous processes of the first 13 dorsal vertebræ.—*I.* To the spinous processes of the three last cervical vertebræ.

Spinatus brevis.—*O.* Inferiorly by tendons from the spinous and oblique processes of the first dorsal, and the five last cervical vertebræ.—*I.* By a strong tendon to those processes of the second cervical vertebræ.—*U.* This and the above extend the neck.

Cutaneous *.—*O.* From the cervical ligament covering all the muscles of the neck, of the head, and part of the scapula, united with the common muscle.—*I.* By uniting with its fellow in the front of the neck, opposed to the trachea, and to the point of the sternum.—*U.* A species of panniculus carnosus to the neck.

Inter transversales.—*O.* From the interval between all the transverse processes of the cervical vertebræ, except the first.—*U.* Assists in the bending of the neck.

Musculus communis †.—*O.* From the inferior and anterior part of the arm, passing to the point of the shoulder, when the body extending up the neck divides into two portions.—*I.* By one portion having several tendons, into the 2d, 3d, 4th, and 5th transverse processes of the cervical vertebræ. By another into the tuberosity at the petrous part of the temporal bone.—*U.* To move the head, neck, or arm, according to its fixed point. (*See Muscles of Arm.*)

* This considerable expansion is to be regarded as a muscle of the skin of the neck; as the cutaneous described among the muscles of the nose, is to the skin of the face. (*See Panniculus carnosus.*) This is the first muscle that appears on raising the skin of the neck, and is attached by aponeurosis to the spine of the scapula; and very intimately to the common muscle. These two muscles have been described, I believe As one, under the name of levator humeri; and from its insertion and origin it does appear, that this is a more proper description of it; at the same time that it must be allowed the upper portion can corrugate the skin, and that there is a line of division between it, and the part which Bourgelat calls the common; I shall therefore, at present, continue this division.

† The common muscle is so called as being common to the head, neck, and arm; this and the cutaneous has been considered by some English veterinarians as one, the levator humeri. This portion can act upon either as its fixed point is altered. Bourgelat describes it as giving off a part at the point of the shoulder to the sternum; but this part is evidently a distinct muscle, the sterno brachialis: nor is it inserted so low, or attached so low in the arm as he describes, though its aponeurosis extends downwards in union with the aponeurosis of these parts.

Muscles of the Back and Loins.

Longissimus dorsi.—*O.* From the outer crista of the ilium, the transverse and spinous processes of all the lumbar vertebræ, and from the spinous processes of the five last dorsal.—*I.* By fleshy portions into the upper part of the ribs, and by tendons into the transverse processes of all the dorsal, and the two last cervical vertebræ.—*U.* To stretch the vertebræ, and to draw the trunk upwards; therefore it must be of great use in rearing, galloping, leaping, &c.

Inter transversales.—*O.* These are small muscles whose number is equal to the dorsal and lumbar vertebræ, situated obliquely on each, from behind forward; extending from the transverse process of one, and from the spinous of the other from the sacrum. —*U.* To draw the spinous and transverse processes together, assisting in the flexion of the back.

Interspinales.—*O.* These occupy the interval which the spinous processes leave between them.—*U.* To assist in the motions of the spine.

Psoas lumbaris *.—*O.* From the lateral part of the bodies of the three last dorsal vertebræ, and the four first lumbar.—*I.* To the inferior and internal part of the ilium near the cotoloid cavity.—*U.* It is an antagonist to the long dorsal, serving when the animal rises to bring the body down again; when, on the contrary, he rises behind, the point that was before fixed now becomes the moveable point, and the hinder parts are brought forward by it. It acts in concert with the muscles of the lower belly, and assists in various motions.

Muscles of Respiration.

The muscles used in respiration are common and proper. The first are those whose use is common to this function, and to the motions of other parts: the proper are those only used in the elevation and depression of the ribs, or the enlargement of the cavity of the chest. (*See Respiration.*) The proper are,

Levatores costarum †.—*O.* These are five to each side; arising, the first from the transverse process of the second dorsal vertebra; the second from that of the third, and so on.—*I.* The first to the anterior and superior part of the third rib; the second to the fourth, and so on with the rest.—*U.* To elevate the ribs.

Intercostals, external and internal.—*O.* They fill up the intervals between the ribs, and cross each other, the two plans being separated by a cellular tissue; the external arising from the posterior acute edge of each anterior rib, the whole length, pointing obliquely from downward upward; and the internal in the same manner, but under these, and point contrarily from above downwards.—*I.* Both external and internal into the sinuosity of each

* Psoas parvus.

† These, in the human, are only considered as portions of the intercostals.

posterior rib.—*U.* To elevate the ribs, acting on the first, which, being immoveable, is thus the fixed point.

Transversalis.—*O.* From the external surface of the first rib passes over the 2d and 3d.— *I.* To the external surface of the fourth.— *U.* It assists in elevating the chest.

Sterno costalis.—*O.* From the internal surface of the sternum.— *I.* By a tendinous production to the cartilages of the true ribs.— *U.* Is similar to the former.

The Muscles common to Inspiration are,

Serratus longus.—*O.* By two portions, the anterior by an aponeurosis from the spinous processes of the 12 first dorsal vertebræ, the posterior by a similar aponeurosis to the spinous processes of the lumbar and of the six last dorsal vertebræ.—*I.* By fleshy digitations to the four last true, and the four first false ribs; and by similar digitations to the posterior edge of the 7th or 8th last false ribs, digitating with the posterior serrated portions of the great oblique; and by a very strong portion to the internal part of the scapula.—*U.* When the shoulder is fixed, it acts on the chest; and when that is fixed, it moves the scapula. (*See Anterior Extremities.*)

Intercostalis communis.—*O.* From the transverse processes of the lumbar vertebræ.—*I.* By tendons to all the ribs at the superior part of their posterior edge.—*U.* To elevate and depress the chest.

* *Diaphragm.*—This is a most important muscle, not only to the chest, but to the belly, and will be described at large, in treating of the chest. (*See Splanchnology.*)

Muscles of the Abdomen.

The parietes of the abdomen are formed by four pair of muscles.

Obliquus magnus seu Obliquus abdominis externus—Is the most external of these muscles, but is not satisfactorily described by Bourgelat. It arises by fourteen or fifteen fleshy appendices from the fourteen or fifteen last ribs, some of which intermix in a serrated manner with the digitations of the serratus muscles. It is likewise strongly attached to the spine of the ilium from the last rib, and is covered laterally by the latissimus dorsi, and adheres anteriorly to the pectoralis and intercostal muscles. From these origins and attachments it is continued down tendinous, confounding itself with the tendinous parts of the lesser oblique and transverse; and, meeting its fellow, is united with it from the sternum to the symphysis pubis; forming a white line, thence called *linea alba.* Its junction by this means is so intimate, that it might be regarded as a biceps muscle, with as much propriety as a distinct pair. About the middle of the linea alba in the fœtal colt, it is perforated by the umbilicus or navel-string. The tendinous portion attached to the spine of the ilium is not continued in its attachment from thence to the symphysis, but forms a strong band

which is unattached for some space, and then is inserted into the pubis; this is called *Fallopius's* or *Poupart's ligament*. This unattached portion consequently leaves an opening, under which pass the crural vessels going to the extremities. Hence any of the contents of the abdomen protruding with these, is called crural hernia. This expansion of the external oblique forms a species of tendinous doubling, but not a complete abdominal ring, as it is called in the human. Through this the spermatic chord of the male, and the round ligaments of the womb, in mares, pass obliquely between the internal and external oblique, for an inch and half before either chord or ligament turns into the pelvis. It will therefore be evident, that when strangulated hernia takes place in the horse, it can only happen in the mouth of the sac before Poupart's ligament, under the obliquus externus tendon; but in consequence of the horizontal situation of the animal, hernia at the abdominal ring is very rare. The contents of the abdomen may likewise now and then be protruded under Poupart's ligament, and under the expansion that the external oblique gives off, or connects itself to, of the thigh. This species is called inguinal hernia, and of which the celebrated horse Mentor died; though it is a very rare instance.

Obliquus parvus, seu Obliquus abdominis internus.—The fibres of this muscle have a contrary direction to the preceding, being situated obliquely from above downwards, and from behind forwards: it arises from the inside of the false ribs by tendinous origins, and superiorly by a similar aponeurotic expansion with the external; posteriorly it originates from the anterior angle of the ilium; it is then continued, but not exactly in the same manner as in the human, and is inserted tendinous into the linea alba, the whole length of that line, and into the inside of the pubis. Its tendon permits the passage of the spermatic chord over its edge; and as it passes, it gives off some muscular fibres to form the cremaster muscle, frequently in conjunction with the transversalis.

The *uses* of these two muscles, it must be evident, are various and important; they tend to support the abdominal contents, and very forcibly act in the expulsion of the fæces, and in the delivery of the foal from the womb: they are likewise very considerable auxiliaries in respiration, expelling the air from the lungs, by lessening the cavity of the belly, and thus forcing up the diaphragm. They are probably assistants in progression also. When one of each of these muscles acts without its fellow, the body must be strongly drawn to one side: also when the body is elevated, particularly in galloping, they bring the pelvis and hind legs under the centre of gravity of the body; that is, they double those parts under the animal, acting with the psoas muscles. In their relaxation the muscles of the back become antagonists to them.

Transversalis.—This muscle has a species of division that, properly, forms it into two to each side, which originate by an aponeurosis from the transverse processes of the lumbar vertebræ; pos-

teriorly from the spine of the ilium, expanding on the posterior and lateral part of the belly, extending up to the internal edge of the false ribs, and to the xiphoid cartilage, where it begins its insertion into the linea alba, and continues it posteriorly. It assists forcibly in the compression of the abdomen.

Rectus abdominis.—Arises from the pubis, one on each side of the linea alba, and is exposed on removing the external oblique; it grows rather broader and thinner, as it advances; but again narrows to insert itself into the cartilages of the last five or six true ribs by fleshy and tendinous portions. These muscles appear only as fleshy bands in front of the abdomen, of about half a foot in breadth, intersected by tendinous lines in a similar manner with the human rectus; only that in the horse there is six, seven, or eight of these transverse tendinous interlineations, instead of three which exist in ourselves. The use of these intersections of tendinous fibre is for the purpose of strengthening the muscle, which otherwise, from its great length, would be weak; and hence the superior number of these lines in the horse is accounted for; the additional length requiring this additional support. This pair of muscles, it is evident, must operate in supporting and pressing the abdominal contents.

Muscles of the Organs of Generation.

Dartos.—This, I think, should be considered as a common muscle to the scrotum, lining its internal surface; it is usually considered as a mere cellular membrane, but when its great power of contraction is considered, it is more than probable that it has a muscular structure.

Cremaster.—*O.* From the posterior edge of the obliquus internus, the aponeurosis of the fascia lata, and the transversalis.—*I.* By a fleshy expansion around the chord, and over part of the vaginal coat of the testicle.—*U.* To draw the testicles upwards during violent exertions, that they may not be injured, for which it is particularly fitted, being a part of those muscles already, at such times, in strong action.

Erectores.—*O.* From the posterior, superior, and internal part of the tuberosity of the ischium, descending obliquely from behind forward, embracing the two cavernous bodies of the penis.—*I.* To the lateral parts of those bodies.—*U.* To draw, constrict, and raise the penis.

Acceleratores.—*O.* From the ligament at the posterior part of the pubis, and the membranous part of the urethra in an oblique direction.—*I.* By a tendinous line into the urethra nearly its whole length.—*U.* To accelerate and press forward the urine and semen.

Triangularis, seu transversalis.—*O.* From the tuberosity of the ischium.—*I.* Into the accelerators and the urethra.—*U.* To assist the former.

Muscles of Clitoris.

First pair, seu sphincter vaginæ.—*O.* From the lateral parts of the sphincter ani.—*I.* Into the lateral parts of the body of the clitoris.—*U.* Contracts the vaginæ, and compresses the clitoris.

Second pair, seu erectores clitoridis.—*O.* The inner part of the crus of the ischium.—*I.* To the root of the clitoris.—*U.* It raises the clitoris.

Muscles of the Anus.

The muscles of the anus, I have found, in the subjects I have dissected, to be two pairs, and a single one; retractores, levatores, and a sphincter. Bourgelat describes the levatores as a small pair, which they are: but totally overlooks the retractores, which are very considerable. La Fosse notices these, but makes no mention of the others. The levator pair are similar to the transversus perenei of the human; but seem more immediately appropriated to the anus, hence I have so termed them.

Retractor ani.—*O.* From the ischium superiorly, where it forms the acetabulum; and in part from the sacro ischiatic ligament, passing rather upward and backward.—*I.* Into and around the rectum, leaving a line between its insertion and that of the sphincter.—*U.* To retract and draw in the anus.

Levator ani.—*O.* From the lateral muscles of the tail, and from above, having an aponeurosis, giving it firmness.—*I.* Into the bottom of the anus at the outer part, crossing its fibres.—*U.* To elevate the anus.

* *Sphincter ani.*—*O.* By a strong fleshy band from around the end of the rectum, having a line of separation between it and the retractors.—*I.* Runs into and around the anus, forming an orbicular muscle.—*U.* To close the anus, preventing the constant escape of the fæces, and the entrance of air, insects, &c.

Muscles of the Tail.

These muscles are very intricate and difficult to dissect, so as to render them distinct from each other. It appears to me, that the divisions made both by La Fosse and Bourgelat, are too numerous; and that there are fewer real muscles, with more numerous origins; but as Bourgelat in point of appearance, origin, and insertion, is apparently nearly correct, I shall continue to follow him.

Sacro coccygiens superior.—*O.* From the superior part of the sacrum, where its transverse processes appear.—*I.* By short tendons into all the bones of the tail superiorly.—*U.* To elevate the tail.

Sacro coccygiens inferior externus.—*O.* From the lateral internal part of the sacrum.—*I.* By strong tendons rather inferiorly into each bone of the tail.

Sacro coccygiens inferior internus.—*O.* By an intermixture of heads in the same manner with the preceding.—*I.* By tendinous produc-

tion to the first five bones of the tail.—*U.* These two muscles depress the tail.

Lateralis.—*O.* By tendons from the spinous processes of the last two lumbar vertebræ and sacrum laterally.—*I.* By tendons into all the bones of the tail, laterally.

Obliquus.—*O.* By a flat tendon from the sacro-sciatic ligament, passing obliquely upwards.—*I.* To the inferior part of the sacrum and first five bones of the tail.—*U.* These two muscles perform the lateral motions of the tail.

The tendons and fleshy parts of the muscles of the tail, all take rather a lateral direction, so as to form it into a kind of square. The elevators run on each upper angle, and the depressors and oblique, on each lower angle. The depressing muscles are much the strongest, which has given rise to the practice of nicking, or dividing those muscles whose contraction depresses the tail. The lateral muscles are, I conceive, the strongest depressors of the tail, when both are in action: when one acts alone, the tail is carried to one side; and as these are placed very near the centre of motion, and the tail is a long body to wield, especially when armed with long hair; so it was necessary they should be strong to enable the animal to brush himself, and prevent the attack of insects. Besides these muscles, those forming the upper angles, likewise act laterally when only one side contracts at a time; were this not the case, a nicked horse could not afterwards carry his tail to either side; for the lateral muscles of the lower angles are usually divided in the sections made in this operation, and it is necessary they should, as being, as I before mentioned, when in conjoint action, strong depressors. It is from a want of anatomical knowledge of the tail, that it is so often set awry; for if the sections, particularly those more remote from the tail, are not made of an equal depth and extent laterally; some part of the contracting fibres will remain, and the horse carry a false tail.

The muscles of the extremities are described in Section XVII, which is dedicated to a minute examination of all the parts forming the fore and hinder limbs.

Sect. XI.

BURSALOGY.

THIS subject comprises a knowledge of those appendages to tendons, whereby the effects of friction are prevented. Tendons are usually furnished with a sheath or theca, within which a mucus is secreted of a glairy, slippery nature; by this they are enabled to slide within these sheaths with great ease. At the extremities of the tendons, particularly in parts more immediately liable to pressure

or friction, they are frequent and distinct, when they are called *mucous capsules*, or *bursæ mucosæ*. These vaginal coats of the tendons appear formed of a dense cellular membrane, whose internal surface is very vascular, and secretes this mucus. From external injury, or other causes, this internal surface becomes at times inflamed; and if its resolution is not effected speedily, coagulable lymph is thrown out, which is not always again absorbed, but remains between the tendons and its sheath, occasioning distension and lameness, from the prevention that arises to the freedom of motion; therefore, we are at no loss to account for that swelling, hardness, and lameness, that is usually seen in horses worked hard, existing in the neighbourhood of the flexor tendons or back sinews. The mucous capsules at the extremities of the tendons sympathise with the constitution under hard work, and suffer an increase of their contents, commonly called *windgalls*; which are therefore not in themselves a disease, but an effort of the constitution to prevent the effects of increased pressure. Something similar is sometimes observed in the human subject, originating either from strains or pressure; they are frequent in the wrists from the first cause; and, from the latter, are very common to the knees of housemaids, by scouring. In horses, the parts most usually affected with them are the flexor tendons of the pasterns, before and behind, and those of the hock (see *Windgalls*). For a detailed account of the *bursæ mucosæ*, I would refer the student to Monro's description of them, with plates; and to Fourcroy's *Mémoire des Tendons*; for, as it has been seen, that the muscles of the human and horse have a considerable similitude; so it may be readily imagined those of the tendons and mucous capsules have likewise.

Sect. XII.

ANGIOLOGY.

THE *vessels* of the body are divided into *arteries*, *veins*, and *absorbents*; and, except the hair hoofs and epidermis, there is perhaps no part of the body without them.

Of the Arteries generally.

The *arteries* are canals, whose origin is either from the aorta, or pulmonary arteries, which are the only two original arterial trunks in the body. Considered generally, they are long membranous canals, which gradually become smaller as they proceed from the heart toward the extremities. They appear to have three coats, and it is not improbable that the existence of these in various proportions, occasions some considerable phenomena in health and disease.

These tunics are an external elastic, a middle muscular, and an internal cuticular. The external, appears a thick, dense, cellular membrane, whose elastic powers are very considerable, more particularly so in the aorta, near the heart; where its elasticity is sufficient to preserve the cylindrical form of the artery when empty. By their elastic power, the arteries are capable of being distended so as to admit of a larger quantity of fluid than is merely sufficient to render them cylindrical: by this likewise they can adapt themselves to a smaller quantity than is usual; were it not for this power, a small hæmorrhage must prove fatal: hence, therefore, the arteries are always cylindrical, while within the body, unless altered by pressure. The elastic powers appear in different proportions in different horses, as in different men; from which arises some phenomena in the different constitutions of individuals of each species, giving some a greater disposition to inflammation; which is called a sanguineous temperament. The muscular coat of the arteries is interposed between the two others, and appears formed of fibres nearly circular, extending around the artery by several segments joined together. The muscular tunic appears to exist in greater proportion in the horse than in the human; and this accounts for the stronger disposition to inflammation: and from this cause gangrene soon arises, the process of ulceration is quicker, and granulations more speedily formed. To this cause, it is probably owing, that acute inflammations in the horse run through their stages so much quicker than similar affections in the human. Inflammation of the lungs frequently terminates in mortification in forty-eight, and sometimes thirty-six hours. From this power also it is, that a horse can bear the division of a much larger artery without danger than a man. Even dividing of the carotids takes a very considerable time to produce death, while in the human, it follows almost instantaneously. From the strength of this muscular coat in the capillary arteries, when they are stimulated, as in the cold fit of fever, the blood is forced back into the larger vessels, or pressed forwards into the veins. It is this that produces the shivering and sense of coldness in these cases.

The arteries themslves are furnished with small arterial branches, which ramify on their external coats. It is thought that they have likewise nerves ramified on their substance. Different parts are more or less plentifully supplied with arteries, according to their nature: secreting organs have usually large trunks, as the kidneys, the spleen, &c.

Our knowledge of the termination of these vessels is very confined; we can readily see they frequently terminate by anastamosis, or the uniting of one branch into another, whereby the blood has its course in some measure altered. We know also, that they terminate in veins, because we can empty the arteries, by drawing the blood from the venal trunks; and because injection forced into the arteries, in many instances, enters the veins: they likewise terminate on secreting surfaces, in which case the contents of the

artery become changed, and the part of the blood having undergone fresh combinations, is poured forth in a new form; and the remainder returned by venal branches. Another common termination of the arteries is by exhalent openings.

The living power of the arteries must be great, for they are capable of extending themselves through coagulable lymph thrown out, whereby they organize it; this we see take place in the callus of bones, and in cicatrices, which in time become vascular; but an artery, when divided, will not become pervious, though a vein will. The evident use of the arteries is to convey the blood from the heart to the different parts of the body, furnishing nutrition to those parts, by keeping up their vital principle, and affording them heat, as from them also are secreted the different fluids: hence their office is very important; and an intimate knowledge of their functions forms a very principal branch of physiology; as a well-grounded acquaintance with their situation is likewise essentially necessary to the veterinary surgeon.

Mr. Hunter has taught, that there is a strong affinity, or peculiar connexion between the blood and its vessels; and his opinions on this subject have led to considerable alterations in our manner of treating diseases in general, and wounds in particular. The fluid state of the blood appears connected with living vessels; blood parted from them dies and coagulates. The blood likewise stimulates its vessels, which, perhaps, is one very principal cause of their contraction: this stimulus should be in a certain degree; if increased, disease is produced: it is not unlikely likewise, that a defect in this stimulus may also produce derangement. As the use of the arteries is to convey the blood from the heart, so the mode in which this is done is worthy of investigation: we are not perhaps aware of all the phenomena of circulation, but we are aware of a certain sensation in the artery, called *pulsation;* and which, from various experiments, is found to arise from its being alternately in a state of distention and relaxation. It appears, that when the left ventricle contracts, and forces the blood into the arteries, the pressure of the fluids occasions a distention of their coats, and a consequent dilatation, which is termed their *diastole:* when the left ventricle ceases to act, and becomes distended, then the impetus against the sides of the vessels ceases, when the muscular fibres of the artery contract and lessen its size; and this state is called its *relaxation* or *systole.* The pulse, properly so called, is this state of dilatation of the artery; and so many renewed dilatations as the arteries make in a minute, so many is the pulse said to be.

The distention of an artery may be so great as to overcome its contracting power, as any elastic body may be distended beyond its tone or capability of recovery; hence a small pulse is not always a sign of general debility: for in inflammation of the vital organs, this distention of the vessels frequently takes place to such a degree as to prevent their natural contraction; and a small pulse is by this means produced: but if the over-distending column is removed by

copious bleeding, the over-stretched muscular coat recovers its tone, and can contract on its contents; and thus, in such cases, the pulse is found to rise on bleeding. The bladder, we know, under long retention of the urine, becomes so distended as to be incapable of contracting on its contents, and, unless it is artificially emptied, the muscular coat will give way and burst. It is therefore probable, that an inflamed part is not in a state of increased strength, though it is of increased action; but, on the contrary, that as the vessels are preternaturally distended, they are in consequence weakened: hence, in some local inflammations, or where a part only, has its circulation increased; topical bleeding, by emptying the vessels of the immediate part, shall prove highly useful; while, on the contrary, general bleeding may, in the same case, be prejudicial, because it might weaken the same vessels, by weakening the system in general, and render them less able to contract. We may, therefore, learn that instances may occur where diminishing the general strength might augment the inflammation.

From various circumstances we are aware, that the arteries in the living animal are always full; we see it by the microscope, and we know that the new column of blood can be but small, in proportion to the contents of the whole arteries; yet it is sufficient to dilate them, and to cause their consequent contraction. As the velocity of the motion of the blood, in some measure, decreases as the distance becomes greater from the heart, from the anterior wave, moving slower than the posterior newly received; and as the force of the heart decreases, and that of the arteries strengthens, the farther they are removed from it; so at last the column is pressed on by one regular force: thus in every minute artery divided, there is a regular stream, with scarcely any jet: this, however, only takes place in the minutest arteries. We thus see why there is no pulsation in the veins; they receive the blood from the arteries in one equable stream, and continue it by the last impulsive force of the heart, and the new one of the arteries.

Of the Pulse.

It has been explained, that the contraction of the heart causes a dilatation of the artery, or its *diastole;* and the cessation of action in the heart, or its distention, produces the contraction of the artery, or its *systole;* and that these two causes operating alternately, produce the phenomena of circulation.

This momentary increase of capacity in the artery whereby its diameter is enlarged, is called its *pulse;* and the more frequent are these dilatations in it, or the less numerous, so is the pulse quicker or slower. From the regularity of the motions of the blood, the pulse is felt in all parts of the body at the same time; and as there is seldom disease present without an alteration in the arterial system, either accelerating the motion of the blood, or retarding it, so it becomes always a very important matter to ascertain the several states in which the vessels concerned in circulation may be.

It is a little remarkable, that though the horse's pulse is very easily and conveniently felt from the branch of the internal maxillary that runs over the posterior jaw; yet, authors who have written, have either omitted it entirely, or have given the most vague directions with regard to it. Bartlet recommends feeling it by the leg, by the carotids, and by the heart itself. Mr. Clark speaks of it as most easily felt, at the origin of the temporal artery, at the base of the ear: but it is no where so conveniently observed, as at the part I have described (*vide o, Plate* III): and when any thing prevents its being felt at the jaw, it may then be found by the metacarpal artery, on either side of the pastern rather posteriorly.

The pulse is slower in all large animals than in small ones; hence the pulse of a dog is from 80 to 110, according to his size; the pulse of the human, as being much larger, is from 65 to 70. But in the horse, as a still larger animal, it is from 45 to 55. In young animals, the weakness of the system, and its irritability are considerable, hence they have a much quicker pulse: the colt's pulse is from 70 to 80; the human infant's beats more than 100: this gradually lessens to the adult period, when it follows nearly the standard we have noticed. As the heart of a large animal has a longer way to send its blood, and its resistance is consequently increased, so it takes a longer time to accomplish its contraction; and thus there is not only a difference between the different species of animals, but between individuals of the same species as they vary in size: from which, the smaller the horse, the quicker is the pulse. Many circumstances must be taken into consideration in studying the pulse: a particular irritability of the system occasions a quickened pulsation. Fear likewise generally occasions a very considerable increase of it, for which reason great caution is necessary not to alarm the animal, or the pulsating vessel will present a wrong indication.

In attending on diseases, it is hardly possible for the veterinarian to pay too much attention to the *pulse*, or to attach too much importance to its variations, as it becomes a criterion of very considerable certainty, and a guide that seldom leads to error. The pulse may, as I have said before, be felt by the posterior jaw, the fore-fingers may be held on the inside of the jaw, and the thumb on the other, by which the artery may be detected and held in its situation, and very accurately felt by the resistance of the bone underneath. Every person ought to accustom himself to the natural state of the pulse, by frequently feeling different pulses of healthy horses; by which means the varieties produced by disease, will be easily detected: for an affected pulse does not only consist in its quickness and slowness, but also in its hardness and softness: the differences between either of which, and that of health, can only be learned by attention. Thus the pulse may be *full*, or *small;* it may be *quick*, or *slow;* it may be *hard*, or *soft;* or it may be *regular*, or *irregular;* and to which varieties we may almost refer all the different states of the pulse. A *full strong pulse*, where the resistance to the pressure of the fingers is very considerable, giving a bounding stroke, and evidently betokening an increase of the diameter of the artery, seldom

exists in the horse. Something like it only occurs in spasmodic colic, and a very few other unfrequent affections. The highest inflammatory diseases increase the quickness of the pulse, and that generally in proportion to the extent of the affection. They also produce in the same proportion a hardened vibrating stroke; but which is yet without the full bounding feel, present in these cases in the human: thus though the pulse in the horse presents a much more unerring criterion of the state of disease, yet analogy fails in detecting a similarity between the two; and experience alone ought to direct the judgment. In treating therefore on diseases, whenever the term *full pulse* occurs, it must be considered to mean that state only, we have described. In all violent inflammatory affections (with some exceptions noticed) therefore in the horse; and also in oxen and sheep; in addition to the quickness of the pulse, there is a corded, hardened state in the feel; and these therefore are the distinguishing marks of strong muscular action in their arteries. The *pulse* may have, it is hence evident, a healthy fulness, or strength; or it may be increased to a diseased strength; but which, as before insisted on, is principally characterised by its corded vibratory stroke; the feel of which is remarkable, and will soon become familiar. In such cases the frequency is very generally increased also. This pulse is usually present in general inflammation, and in inflammations of the cellular membrane, muscle, skin, &c. and other organs not immediately essential to life, especially where any of these are inflamed to such an extent as to affect the constitution: but in inflammation of the vital organs, particularly of the contents of the thoracic and abdominal viscera, this pulse is not always present. In inflammation of the brain, the pulse has sometimes a considerable fulness and frequency, accompanied with great hardness. At others it is oppressed, but it is a vibratory oppression.

A *small pulse* is usually present in all cases of great debility, and is generally attended with increased frequency. When it is very small and thread-like, it shews that the debility is extreme, and prognosticates a fatal termination of the existing disease. If with this degree of smallness it varies in its regularity, or intermits, it is even more certainly a fatal prognostic. We must be careful not to be misled by a small *oppressed* pulse frequently present in inflammation of the vital organs, particularly of the chest, by mistaking this for a pulse of true debility. Such state is only a partial debility of the vascular system from over-distention, and removes on lessening the column of the blood: hence, in these cases, the pulse is found to rise on bleeding, and so long as it does, it is prudent to pursue it.

A *quick pulse* usually denotes considerable irritability in the system; there may be natural or common causes for quickness of the pulse; as youth, smallness of size, fatigue, a hearty meal, and a particular temperament; but when none of these natural causes are present, great quickness of the pulse proves the irritability of the vascular system, and a want of power. But its indication becomes very different as it is accompanied by fulness or smallness. When the frequency of the pulse is considerable, with an increase of

strength, it shews strong inflammatory action, either local or general: if local, it is usually, as we have noticed, of the parts not immediately essential to life: on the contrary, when with a frequent or quick pulse, it is also small and oppressed, it frequently shews a difficulty in the heart and arteries to contract on their contents, which may arise from debility of the system in general, or only from the debility of the arterial system in particular, occasioned by this overdistention we have before noticed, as present in inflammation of some of the vital organs, more particularly the lungs.

A *hard* or *soft pulse* presents contrary indications. In most inflammatory affections there is present a considerable degree of this peculiar vibratory hardness in the pulse, generally accompanied by an increased frequency also. This vibratory hardness is the usual attendant on inflammation of vital organs; and, in fact, becomes their characteristic: in the intestines it forms the grand criterion between inflammatory and spasmodic colic: in the inflammatory, we have almost always a frequent pulse, without fulness; sometimes even very small; but still with a corded, vibratory, and rather hardened stroke. In spasmodic colic on the contrary, both the fulness and hardness are more conspicuous. In inflammations of the lungs, there is, as has been noticed, often very little hardness, sometimes not much quickness either; yet the oppressed feel of the pulse is very evident: but when the affection is more diffused, as in catarrh, it has usually some degree of hardness, and is always quicker, but not always smaller. This hardness in the pulse is difficult to describe; but it seems a more vibratory stroke of the artery, or a something more like a rap against the finger, than the full, but equable hard stroke, given by the human artery in such cases; and the sensation it gives can only be learned by habit. As this hardness is almost always a mark of inflammation, so a soft pulse, exhibited by the arteries yielding to a slight pressure, usually shews a cessation of the inflammatory diathesis; thus, after the hot fit of fever is removed, the pulse from being hard becomes soft: it is likewise commonly soft at the decline of fever in general: whenever there has been considerable local inflammation, and pus forms, it likewise becomes soft.

A *regular pulse* is sometimes found under very diseased affections; but it is usually increased in its fulness or smallness, or in its hardness or softness: a regular pulse with a proportionate fulness is one of the strongest marks of health; as an irregular pulse almost always shews disease: but the irregularity may be occasioned by organic affection; that is by a peculiar formation of parts, or some disease about the heart, as ossifications of its valves, or of the larger vessels.

Irregularity in the pulse is a mark of great irritability, and if not arising from any organic affection, it is a mark of great debility also. Inflammation of the heart usually is accompanied by great irregularity in the pulse, with smallness; the heart contracts several times, and then stops till more blood is sent to it. An *irregular pulse* in fever shews great danger: it usually accompanies mortification and

gangrene, and when inflammation of the lungs terminates in this way, it is usually present. A very particular irregularity of the pulse is present when water is thrown out into the chest; besides its intermission, it seems to be undulating through a bladder of water. This pulse should be particularly noticed, as, when once felt, it need never be forgotten.

The Distribution of Arteries.

The *aorta* is the principal vessel of this system, and originates from the left ventricle of the heart, at its anterior and middle part, between the vena cava, pulmonary artery, and the trachea: proceeding in one large trunk a small distance, it divides into branches, one of which is carried forwards to furnish the head and extremities; the other proceeds backwards to be distributed to the rest of the body, but exhibits no incurvation, as in the human.

These divisions form the anterior and posterior aortas, the one being situated before, and the other behind; but before which division, the original trunk has given off a pair of small arteries, immediately at its origin, under the semilunar valves, called the coronaries.

The *anterior aorta* is continued single to between the second and third rib, and then divides into two unequal portions, called its right and left branches. The *left division* first gives a small branch to the pleura, next what may be called the dorsal, and usually two others, one between the first and second rib, and another between the second and third, which are the anterior and posterior cervicals: from this, passing towards the first rib, it gives off the left vertebral, and the internal pectoral; and then being continued over this rib, it takes the name of axillary.

The *right division* of the anterior aorta is nearly twice as large, as well as longer than the left. Its first branches of consequence are one to the pleura; an anterior and posterior cervical, or what has been called a bronchial; then the internal pectoral, but which is sometimes, I believe, given off after the carotids, which are the next divisions of this branch, arising by one large trunk. The continuation of this division of the aorta then gains the edge of the first rib on the right side, and forms the right axillary.

The *arteriæ coronariæ* arise from the aorta immediately on its leaving the heart, one on the right, the other on the left side, and are distributed around the base of that organ like a garland, from whence they draw their name.

The *pleural* is usually the first branch given off by the anterior aorta, but sometimes arises from the dorsal; its ramifications are distributed to the pleura.

The *dorsal* form the next pair, the left arising from the left division of the anterior aorta usually, and the right from the right division, sometimes from the right cervical. It gives ramifications to the pericardium, to the muscles under the scapula, and the neck; and generally furnishes the first two or three intercostals.

The *cervicals* are two pair on each side. The left cervicals

usually arise from the left division of the anterior aorta, pass between the first, second, and third ribs, and are distributed to the cervical ligament, and to the muscles of the neck and withers. The right cervicals arise from the right division of the aorta, and give rami to the œsophagus, mediastinum, and surrounding parts.

The *vertebrals* are two important arteries, the right arising from the right division of the anterior aorta, after those we have described; and the left from the left division: they are given off opposite the first rib, and pass under the transverse process of the first dorsal vertebra, insinuating themselves between the sixth and seventh cervical, and are continued up through the foramina at the base of the transverse processes of the remaining six of these vertebræ: as they pass, they send off small branches through the lateral notches in the vertebræ to the spinal marrow, and likewise to the muscles of the neck. From these divisions they become very small near the head; where they give a small ramus, which usually passes through a foramen in the oblique process of the atlas, to communicate with the external carotid, by which a communication is kept up between these vessels. After they have given this branch each, they make a number of inflections to retard the circulation, and uniting, form the basillary artery, which runs on the inner surface of the cuneiform process of the occipital bone, and is finally ramified in the cerebellum, first giving a branch uniting with a similar one of the carotid to form the circulus arteriosus.

The *internal pectoral* is usually the next artery arising from the left division; that of the right side sometimes arises from the right axillary, after it has furnished the carotids. These vessels, soon after they arise, give off a branch, which is the *external pectoral*. The internal pectoral is then continued along the internal surface of the first rib, where it gives branches to the pleura, when gaining the sternum it is continued along its internal surface, giving rami to the mediastinum, diaphragm, and parts around; and is finally ramified in the muscles of the chest, usually first giving off a branch that anastomoses with the epigastric.

The *axillary arteries*.—The left branch of the anterior aorta having furnished these principal, and other lesser branches, has its trunk curved about midway over the anterior part of the rib, and inclines in the axilla, passing out at right angles with the head of the humerus. In its passage to the glenoid cavity, where it takes the name of humeral, it gives off generally three branches, two of which furnishing the scapula, may be called *scapularis inferior*, and *scapularis superior*; the third is distributed about the articulation of the scapula and humerus, and is thence called *arteria articularis*.

The *humeral artery* descends along the internal surface of the humerus, giving a considerable ramus that penetrates the biceps extensor cubiti: when arrived at the inferior part of that bone near its articulation, it makes a fresh division, giving sometimes one, at others two considerable branches, one of which passing between the

ulna and radius, may be called ulnar; though, speaking with analogy to the human, there is no regular ulnar.

The *ulnar*, if allowed to be so called, passes posteriorly between the two bones, and down the lateral external part of the fore-arm, giving the medullary vessels to both ulna and radius, and rami to the muscles of this part; anastomoses at the knee with a branch of the radial, and continues at times in a small branch down the canon.

The *radial* first gives off a branch that passes between the condyles of the radius, in company with a vein immediately under the extensor pedis anticus, and over the extensor metacarpi radialis, and is distributed to the anterior part of the knee. The main trunk is then continued down under the muscles, behind the radius; penetrates the ligaments, and passes within the arch of the pisiform bone; in which passage it sometimes gives a small branch running down the ligament of the canon, ramifying with its parent trunk and with the ulnaris.

Metacarpal artery.—Continued down and penetrating the sheath of the flexor tendon, the trunk that was the radial takes this name, and in company with the metacarpal nerve is continued on the inner side of this sheath, gaining the under portion, and descending in front of the bifurcating suspensory ligaments, in which course it furnishes the canon with its medullary branch, and with a ramus anastomoses with the preceding: having gained the lower part of the canon in company with the metacarpal vein and nerve, it divides just above the fetlock into the two.

Pastern or *lateral arteries*, each of which pass over the sessamoid bone, behind the vein at the lateral part of the pastern, tending rather posteriorly. The nerve which accompanies each is situated still more behind, so that the artery passes between the vein and nerve, which is of importance to remember in some operations on these parts. The pastern artery, when it has passed over the sessamoids, usually forms a small branch that goes backward into the posterior part of the pastern, and a more considerable one that divides and furnishes the anterior part of the joint: sometimes there are more than one of these anterior branches. When the lateral, or pastern artery, arrives at the coronet, near the upper point of the cartilage of the foot; it gives off a branch, called the *coronary*, which passes in front, surrounding the anterior of this part, plentifully supplying its vascular ligament, and anastomosing with the opposite one: near where the coronary is given off, arises another ramus running backwards and downwards within the edge of the lateral cartilage, and distributed throughout the fleshy frog. Having given these branches, the artery itself is continued within the cartilages till it arrives at the posterior part of the coffin bone over its surface, rather nearer the lower than the upper part, and is continued over two thirds of its extent, when it ramifies within it and the sensible laminæ. The lesser branch is continued in a groove in the inferior process, curving over the lower edge of the bone,

and ramifies on its under surface. The posterior branch of the main division finds a passage within a groove at the convex surface of the coffin, behind the line of insertion of the flexor tendon, being distributed both to the soft parts and to the bone, which it pierces in every direction, anastomosing by this means with the branches on the anterior surface.

The *right branch of the anterior aorta* is considerably larger and longer than the left. The branches arising from it we have noticed, but they are by no means always the same. The *bronchial arteries* we only named in speaking of the general division of the aorta. Their origin is by no means invariable; sometimes they arise as we there mentioned; at others, they are given off from the posterior aorta, and now and then from one of the intercostals. They pass one on each side to the right and left lung, and appear to be distributed to ramifications of the bronchia, to secrete the bronchial mucus. We have already noticed that the right division of the anterior aorta, after having given these different branches, furnishes the trunk of the *carotids*, and then ends in the axillary. We shall now trace these vessels, following nominally, one only, as they are both similar in distribution.

The *carotids* arise by one common trunk from the right branch of the anterior aorta, and soon divide into two portions. Each carotid is a very long vessel, whereby the strong action of the heart is counteracted; and hence the horse is less liable to affections of the head than ourselves, in whom these vessels are infinitely shorter. There are only a few insignificant rami given by this artery, before it approaches the head, when it divides into what are termed the external and internal carotids; but they receive this designation more from the parts they furnish, than from their immediate situation.

The *internal carotid* does not arise as in the human exactly, for in him the external gives off some considerable branches first; but in the horse, this vessel appears rather to divide into two at once, without previous branchings. This internal division is very contorted in its course before it enters the skull, at a large foramen near the junction of the sphenoid bone with the cuneiform process of the occipital; by which the blood sent to the brain cannot be too much accelerated; nor can accidental pressure thus deprive the brain of its support. As it enters the base of the skull, it gives a branch, that uniting with a similar one from the vertebral, forms the *circulus arteriosus*. It anastomoses likewise with the internal carotid of the other side, as well as gives branches to the adjacent parts, and finally ramifies throughout the anfractuosities of the cerebrum and cerebellum.

The *external carotid*, after giving off the branch to unite with the vertebral, that has been termed the *occipital*, and which branch, as it passes up, gives several rami to the parts around, furnishes one or two twigs that enter the skull; likewise two or three to the internal and external ear; and a branch also to the parotid gland: after which, the principal trunk makes a curve, and passes over the

os hyoides. It now gives off a considerable branch, which has been named the *posterior maxillary*, principally furnishing the masseter muscle: it likewise parts with *the temporal*, which is erroneously supposed to be distributed to the eye; and as such, has been recommended to be taken up in inflammations of that organ, but which is wholly spent on the upper part of the masseter muscle. As this forms a considerable error in the practice of some veterinarians, the real distribution is carefully marked in the plate of Splanchnology. The trunk, which is then called the *internal maxillary*, is continued under the parotid gland, giving a branch to the pharynx, next *the sublingual*, or *ranine*, to the tongue: sometimes it gives another ramus or two before the large branch passes off to the external part of the face, which we will trace last. Having parted with this principal branch, it next gives a considerable twig, which after entering the posterior maxillary canal, in company with a portion of the fifth pair of nerves, to furnish the teeth with their blood, it comes out by the foramen at the symphysis of the chin, and loses itself in the muscles of that part. The remaining trunk then passes through the sphenoid bone, along the junction of the palatine with the maxillary bones, forming the *palatine artery*, and which gives some rami to the brain and parts adjacent.

The external branch of the internal maxillary, which might, with propriety, be called posterior facial, is an important vessel, not only from its magnitude, *but from its forming the most convenient part for examining the pulse of the horse.* (*This vessel, with its exact situation, is shewn in the plate of Splanchnology, where it is the middle vessel of the three, as it comes from the under edge of the jaw, and then crosses the parotid duct, passing upwards towards the eye. See also, o, Plate* III.) It passes over the posterior jaw near where the tuberous part ends, proceeding upwards, when it branches usually into three principal divisions, which are evident in the plate: the first of these is generally given to the masseter, anastomosing with the temporal: the next may be called the *nasal*, which furnishes the superior and external parts of the nose, as well as gives some branches that communicate with those given to the internal parts of the nose from the palatine. It likewise gives a ramus that runs up to the angle of the eye, communicating with some branches from the inside of the skull. This ramus is, from this course, called the *angular*, and is the proper branch to divide in inflammations of the eye, and not the temporal, which is sometimes done: for the ramifications of the angular are particularly distributed to the coats of that organ; whereas the temporal artery, as we have shewn, is given wholly to the masseter muscle.

The third division of the posterior facial, or external branch of the internal maxillary, is the *labial*, which is the most inferior of the three, and passes down to furnish the muscles and parts below.

The Posterior Aorta.

The *posterior aorta* is continued from the division of the great trunk posteriorly (*see Plate of Splanchnology, but where there is too*

great a mark of incurvation), inclining to the left side of the vertebræ, nearly as far as the sacrum.

Ductus arteriosus.—The aorta, where it passes posteriorly, having a slight curve over the pulmonary artery (*see Plate* IV), presents the remains of a canal, by which, in the fœtus, it communicated with that artery, but which in the adult becoming shrunk and closed, appears now only a slight ligamentous connexion.

The *intercostals.*—The first three or four of these vessels are furnished from other sources; the remainder arise from the posterior aorta, from each side posteriorly, as far as the diaphragm. They are continued on the inner surface of the intercostal muscles, at the posterior edge of each rib, nearly as far as the sternum, furnishing the intercostal muscles in their course. It is evident from this distribution, that in any operation on the ribs, we should be cautious to avoid cutting on their posterior edge: we may likewise hence learn what mischief may be occasioned by a fractured rib, as one or more of these vessels may then be ruptured, and the contents, if the chest should be penetrated, may be diffused within.

The *phrenics* are two arteries given off to the diaphragm, as the aorta passes the crura of this muscle.

The *splenic.*—This vessel forms a great variety in the horse from the human. In man, the splenic is a branch of a considerable trunk, which furnishes this as well as the coronary, the hepatic, and the gastric, and is itself called the *cæliac;* but corresponding to which there is no such artery in the horse: in this animal the splenic arises from the aorta, and besides furnishing the viscus, from whence it draws its name, it gives some branches to the stomach; the blood of which is likewise returned by the splenic vein; but it does not furnish the pancreatic, this arising by a distinct trunk.

The *gastrics, right* and *left,* arise generally by one trunk, which soon divide into these two. The *right gastric* passes along the great curvature of the stomach, distributing its branches over it, which anastomose with the coronary. The *left gastric* is distributed to the other parts of the stomach.

The *pancreatic* is in the horse generally a distinct branch, furnishing the hepatic to the liver, and the coronary which supplies the duodenum, and the pyloric extremity of the stomach.

The *hepatic artery,* derived from the pancreatic, usually is so small, that it is evident it can only furnish the liver with support, but not with blood for its secreting offices.

The *anterior* and *posterior mesenterics* are two considerable branches given off from the aorta at some little distance from each other. The former is distributed to the mesentery, small intestines, and a small branch to the pancreas.

The *posterior* is likewise a considerable trunk, and furnishes the large intestines and mesocolon. These two arteries anastomose freely with each other by a particular branch, and surround the intestines, so as to form a network of vessels. (*Vide k, Plate* IV.) In this artery there have been found worms, particularly in asses.

The *emulgents*, or *renal arteries*, are very considerable trunks given off one from each side of the aorta. The right is considerably longer than the left, on account of the situation of the aorta, and its inclination to the left side of the vertebræ (*vide Plate* IV), where these vessels are displayed. It is likewise usually more anterior than the left, from the kidney of this latter side being pressed posteriorly by the spleen. They are very large, and go off nearly at right angles with the aorta, by which the circulation is retarded, and the secretion better performed from it. They run almost in a direct line to the kidneys, and divide in the depressions of those glands into several branches, which are principally ramified into the arterial part. The *capsular* are two small arteries usually arising from the emulgents, anteriorly, and are distributed through the renal capsules.

The *spermatic* are two small arteries given off from the aorta soon after the emulgents, uniting with the spermatic veins by cellular tissue: they are continued down to the abdominal ring, or the opening corresponding to the part so called in the human, where they cross the ureters in their passage; and having joined the vasa deferentia, the whole being included into one rope by means of cellular membrane, which is called the spermatic cord, they are finally distributed to the testicle. Thus the division of these arteries as effectually castrates, as removing the testicles themselves. In mares these vessels arise in the same manner, but do not pass out of the abdomen; but are distributed to the ovaria and fallopian tubes.

The *lumbar arteries* are usually five or six small pairs arising from the superior part of the aorta, similar to the intercostals, and are distributed to the spinal canal and lumbar muscles.

The *iliac arteries*.—When the aorta has arrived to about the fifth lumbar vertebra, it divides into the two external iliacs, or rather gives them off; and in about three quarters of an inch, in a moderate sized horse, it divides finally into two larger divisions, called the internal iliacs.

The *internal iliacs* are so called, because they are continued more inwardly towards the pelvis, and because they are principally distributed to the parts within it.

The *umbilicals* are usually the first branches from them; sometimes these arise where the division of the aorta commences. In the adult horse they pass under the urethra, and gain the lateral parts of the bladder, to which they give some rami; and then are lost. In the fœtus they are, on the contrary, continued up to the umbilicus, or navel, and carry blood between the placenta and the foal. In some instances they are quite obliterated after birth, and only a ligamentous rope is left; in others they continue pervious to the bladder, as we have described. After this the internal iliac divides into several branches, but whose numbers and distribution are by no means always the same.

The *internal pudendal* is often the next division of the internal

iliac, passing between the bladder and rectum, and is principally distributed to the parts of generation.

The *sacral arteries* are usually, but not always the next, and are two or three small twigs, usually arising from one of the principal divisions; they enter the sacral holes, and furnish the nerves and membranes of that bone, and the tail.

The *gluteal arteries* are the next pair frequently; they run along the internal part of the pelvis in company with the sciatic nerve, giving branches to all the parts around, and are finally ramified in the glutei muscles.

The *obturatrix*, or *ischiatic*, forms the next. The pair pass one out of each foramen thyroideum, and furnish a branch to the corpora cavernosa in the male, and clitoris in the female; and are finally ramified in the articulations of the thigh bones with the pelvis.

The *external iliacs* pass more externally, and likewise furnish parts without the pelvis. They proceed one on each side down the iliac muscles towards the Fallopian ligament, in which course it gives off

A *branch to the psoas* and abdominal muscles: the next usually are the

Epigastrics, which are given off within the pelvis, running obliquely upon the tendon of the transversalis, passing forward on the abdominal muscles, and then ramifying with the internal pectoral.

The *arteriæ profunda* are given off sometimes within, and sometimes without the abdomen; sometimes the epigastrics arise from them. Each, is a considerable branch, and runs down on the inside of the thigh, to be distributed to the muscles about the upper part of the extremity.

The *external pudendals* go out by the crural arch, communicate with the internal pudendals, and are distributed to all the external parts of generation, giving branches to the inguinal glands; they are then carried along the penis, to be finally ramified throughout the glans. This artery in the mare furnishes the mammæ, or bag.

The *crural arteries*.—The external iliacs, passing out of the abdomen at the crural arch formed by Fallopius's ligament, receive here the name of crural, and accompany the psoas muscles out of the abdomen. Each crural artery descending along the lateral internal part of the femur, passes for some way in company with the crural veins between the pectineus and sartorius muscles, to about the middle of the femur; where passing obliquely, it gains the posterior part of the thigh, and is continued down behind that bone. In its course, as we have mentioned, it sometimes furnishes the profunda, which is distributed to the muscles of the inner side of the thigh, that this grand trunk might not be weakened by too numerous divisions. It usually gives some small branches to the neighbouring parts, one of which is given off soon after its origin, and may be called *circumflexa*; as it turns backwards to furnish the joint of the acetabulum, and some of the muscles close to the bone, as well as the bone itself; it likewise gives other small branches. Continuing its course in the ham, between the posterior condyle of

the femur in company with the vein, the crural then changes its name to

The *popliteal*, which first furnishes a large ramus to the articulation of the femur with the tibia, which is called *articularis*: after this, the main trunk soon divides into two principal divisions. The *posterior tibial* is one of these, which is continued down the posterior internal part of the tibia, giving the medullary artery in its passage under the flexor minus pedis, accompanying the vein, and likewise joining the nerve in its course, through a groove formed by the calcaneum (*vide* IV, *Fig.* 1, *Plate of the Posterior Extremities*): it passes in this groove in company with the perforating tendon of the flexor pedis muscle. It here gives several branches, the principal of which furnish the hock anastomosing by all its rami, but by one more particularly with the anterior tibial: one branch is continued down on the inner side of the internal metacarpal bone, which in its passage gives the medullary artery to the canon. In this passage it may be called the *internal metacarpal*, and which is finally ramified into the integuments and parts at the posterior of the canon and pastern, anastomosing freely with the next.

Anterior tibial.—The anterior tibial forms the other division of the popliteal, and runs from between the condyles of the femur obliquely to the external superior part of the tibia, passing between it and the fibula, in company with the vein (*vide* 15, *Fig.* 2), where the artery takes its course under the extensor longus pedis; and again becomes evident between its tendon and that of the lateral extensor, passing with them under the annular ligament, giving a branch to furnish these parts, and another that passes backwards to anastomose with the posterior tibial. It here changes its name to the

External metacarpal artery; which passing from under the ligaments of the hock, is continued down obliquely over the front of the canon, towards the outer small metacarpal bone (*vide* 3, *Fig.* 2), which having reached, it penetrates between it and the canon, and is continued on its inner side under the flexor tendons; in its passage anastomosing with the internal metacarpal, frequently by a direct cross branch behind the bifurcating ligament: accompanying the nerve and vein, it gains the superior part of the sessamoid bones, when it bifurcates into the two *lateral* or *pastern arteries*, in the same manner as in the fore extremities; being accompanied in its division in the like manner by the veins and nerves. The *pastern arteries* follow exactly the same distribution as in the fore feet; we shall not, therefore, follow them farther, but refer to those.

The Pulmonary Vessels.

The passage of the blood through these vessels is termed the *minor circulation*, and is effected by the pulmonary artery and veins. The pulmonary artery is a trunk of five or six inches in length, growing out from the right, or anterior ventricle of the heart: it is continued upon the side of the aorta to its division; where it is

connected with that artery by means of the membranous canal we have described, called *ductus arteriosus:* immediately after which it divides into the right and left branches, whose length is nearly equal, but the size of the left is more considerable than that of the right. Each of these branches is divided upon their entering the lungs into others, which ramify throughout the substance in every direction. From the minute distributions of the artery, the blood is received by the ramifications of the pulmonary veins, when the venal recipient branches increasing gradually, unite into eight principal trunks, which all terminate in the left auricle of the heart *.

The Veins generally.

The veins are vessels that correspond with the arteries in their common office of carrying the blood; but with this difference; that the arteries distribute their blood from the heart to every part of the body, and consequently diminish in their diameter as they advance: whereas the veins bring back the blood from the parts the arteries had carried it to, and restore it to the heart; gradually enlarging in their diameter as they advance. They may, therefore, be considered, as long membranous canals arising in every part of the body, and terminating in the heart. Their fabric is much more slender than that of an artery, never preserving their cylindrical figure when empty: nevertheless, they have considerable strength, and though their coat may become distended, yet they very seldom burst. They are composed of two principal tunics, one of which is cuticular, and the other must be either muscular or elastic. They usually accompany the arteries in their course, lying alongside of their trunks; but as they are subject to pressure from muscular action, and their coats are not strong like the arteries to resist it; and as the stoppage of the blood would be attended with the greatest inconvenience: so there is a superficial order, which has no correspondent arteries; but this set is not so numerous as in the human. They are, however, considerable in the extremities, which are much subject to muscular action.

The veins having less solidity in their coat, are provided with valves: a valve appears a duplicature of their inner coat, rising into a kind of curtain or fold, of which folds there are in the human two, but in the horse three: they are so formed, that the blood passing forward, keeps the vessel continually open; but when, by pressure, the blood is stopped in its course, the valve is pressed backward, and by that means expands, and prevents the return of the blood. These valves are not distributed equally throughout the venous trunks, but are much more universally placed in the horse than the human: in some they are rather more numerous, in others are entirely wanting, as in the foot, where the arterial force is suffi-

* In the human there are only six original veins, the two cavas, and the four pulmonary. In the horse, on the contrary, there are ten original veins, which are the two cavas, and the eight pulmonary. It is remarkable, that neither Bourgelat, La Fosse, nor Vitet, notice this peculiarity in the animal from the human.

cient without them. They exist in most of the cutaneous veins, and in most of those of the extremities, except the parts we have mentioned; but there are but few in the viscera, nor are there any where the circulation is necessarily slower, as in glands. The blood is returned to the heart by a regular flow, at least no pulsation has ever been satisfactorily detected; nor have the veins, that we know of, any contracting power.

Of particular Veins.

The original trunks in the horse are ten; which are the *anterior* and *posterior cavas*, and *eight pulmonary*: to which may be added, the *venæ portæ*. We shall first consider the two cavas.

There are two modes of describing the veins, beginning either by their extremities, and following the course of the blood, tracing their gradual augmentation, and final termination into the right auricle of the heart: or by beginning at the heart, and proceeding to the extremities. The former appears the most correct, and has been followed by some of the most eminent anatomists: but as it is to be considered that the arteries by having been already described in their proper course, give a considerable key to the knowledge of the veins, which in most cases accompany them, which if this description was reversed, would be in a great measure lost; and as it is to be likewise considered, that every impediment should be removed to acquiring the knowledge of the anatomy of the animal in question; and which, on the contrary, should be facilitated as much as possible, as its study will probably fall at first to those who have not either much leisure or patience for investigation: farther, as in describing the course either way, the knowledge of their situation, which is the grand object, is equally attained, I shall choose the simplest method, not regarding the course of the blood, but shall merely consider the veins as trunks arising from the heart, and distributed as the arteries, into all parts of the body.

The real origin of the *cava*, by comparative anatomists, has not been described sufficiently: it is spoken of, as though it arose by one trunk, and then divided; whereas it goes out of the heart by two trunks, from separate parts of the right auricle opposite to each other. (*Though their immediate origin cannot be seen in the plate, it can be readily discovered they arise in this manner.*) The one going from the anterior portion of the auricle, forms the anterior cava; the other from the posterior part, forms the posterior cava. The anterior chiefly furnishes the chest, fore legs, and head. The posterior is principally distributed to the belly, and hinder extremities.

The *anterior cava* arises from the anterior and superior portion of the right auricle; as it passes forward, it inclines a little superiorly, penetrating the pericardium. Opposite to the first rib it divides into four principal trunks, two of which (the axillary) go off at right angles, and two at half right lines with itself, which are the jugulars. The axillaries, the first division of the aorta, are two principal trunks passing over the first rib.

But before these general distributions of the anterior cava, it gives some smaller branches which receive blood from parts corresponding with the branches given off by the aorta in its passage. The principal of these is the *vena azygos*, which passes on the right side of the dorsal vertebræ, and receives the blood from all the posterior intercostals on each side.

The *vertebrals* are given off opposite to the second rib, and pass at the base of the transverse processes of the cervical vertebræ, giving branches between these bones in the same manner as the arteries whose blood they receive, and anastomose with the jugular. The rest of the branches are the superior intercostal, the dorsal, mediastina, diaphragmatica superior, and pectoralis interna, whose mode of origin frequently varies. This branch of the cava then divides, as we have mentioned, into the two axillaries and the two jugulars.

The *axillaries*.—The first general division of the anterior cava, are two principal trunks which pass over the first rib. In the human they are called subclavian, because they pass under the clavicle; but as there is no such bone in the horse, they are called, on account of their situation, *axillaries;* though Vitet has very erroneously named them *sous claviere:* nor have these veins the same unequal length as the human subclavians, as the situation of the cava at their division is not so far to the right; yet still the left is rather the longest. Passing before the axillary artery each gains the humerus, giving in its passage the *external pectoral*, and some other branches corresponding with, and receiving the blood of the branches of the axillary artery: having gained the articulation of the shoulder with the humerus, it takes the name of humeral.

The *humeral* pours its blood into the axillary, sometimes in one, at others in several trunks: when it arises from the axillary in one, it soon after divides into several branches, which are distributed to different parts of the upper portion of the extremity, which distribution is best learned from a reference to the plate. The principal branch descends towards the posterior part of the radius, where it takes the name of radial, in company with the artery; first giving a branch to the posterior part of the knee, called the *ulnar*, and sometimes a deep seated one in front; then passing down all the way with the artery, it anastomoses freely in its course with the cephalic, or external vein, and is continued down in company with the metacarpal artery; when it receives the name of *internal metacarpal*, as the united trunks of the other branch and cephalic do that of external *metacarpal*. The external and internal metacarpal veins usually unite to form the *external* and *internal plantar* or *pastern*.

Besides these divisions of the deeper seated vessels, there is a superficial order situated on the surface of the extremity. The *superficial set* arise from the jugular, usually in one trunk, soon after its origin, passing under the axillary gland; it travels from the chest downwards, towards the point of the shoulder, where it crosses the muscle of the arm, or rather it runs down the biceps muscle; where

it usually gives a branch to run superficially, directly in front of the arm; the principal branch is then continued inwardly towards the inside of the arm, forming what is termed the *cephalic*, or *plate vein*. (*Vide n, Fig.* 2, *Plate* VII). It is this vein farriers usually open in drawing blood from the shoulder or arm. It here receives a branch from the humeral, soon after which, it in some instances, divides into two rami; in others, it is continued down in one united trunk on the inner side of the radius, but superficially. Near the bottom it frequently, likewise, divides into two, which surround the inner side of the knee, but unite again below it, and pass down on the outer side of the ligament, receiving branches from the integuments, and anastomosing with the deeper seated trunk: when arrived at the bottom of the canon, it unites with the internal metacarpal, when the united trunks bifurcate to form the *external and internal plantar*, or *pastern*, as has been before described.

The *jugulars* being part of the principal divisions of the anterior aorta, as we have said, run up on each side the trachea; in their passage they give a considerable branch soon after their bifurcation, which is the cephalic, or plate vein, of the farriers, as we have described. Having given these branches, and furnished the parts in their passage with small rami, of which the principal is the *thyroid*, towards the head they become deeper, and approach the carotids: when they arrive opposite the angle and tuberosity of the lower jaw, about three or four inches from it, they bifurcate into two grand divisions, within which bifurcation lies one portion of the parotid glands. The lower branch may be called the inferior division of the jugular, and the upper branch the superior division. It must be remembered, that the distribution of blood to the head of the horse and man is different; in the former there is no internal jugular properly so called; but the vein performing the office of the internal jugular is a branch of the superior division.

The *inferior division of the jugular* (see *Plate* IV) corresponds to the anterior external jugular of the human, and is called the *internal maxillary;* passing inwards, it gives some small branches to the larynx and tongue, and then passes over the jaw to the outside: running up the anterior edge of the masseter muscle (see *Plate*), it gives a branch to the lips, and another enters a foramen in the lower jaw that extends to the chin, into which this branch enters, with a branch of the fifth pair of nerves, and an artery, to furnish in their passage the teeth of this jaw. Passing up, it makes usually three principal divisions, at other times more, and sometimes less.

The *first branch* penetrates the attachment of the masseter to the spine of the maxillary bone, and running under this spine, gives a ramus that forms the palatine vein; it then penetrates the orbit under the zygomatic process, dividing into several ramifications. The *second division*, which is the posterior of the upper bifurcation (see *Plate* IV), passes inwards under the spine, to meet the temporal vein with which it ramifies, and then gives a branch to form the *angular vein*, and sometimes likewise another that enters the skull. The *other and most anterior* of this superior bifurcation

gives its ramification to the nose. As this branch of the jugular comes under the jaw towards the outside, it changes its name, and is properly the *external maxillary*, as it accompanies the maxillary artery.

The *superior division of the jugular* passes up between the lobuli of the parotid gland, and through it, furnishing it with ramifications; and in this course forms divisions, which are not always alike, being sometimes more and sometimes less; there, however, usually appear three greater trunks, and one or two less. (See *Plate* IV, *where the larger divisions appear.*)

The first of these greater divisions is a considerable one, and corresponds in office with the internal jugular of the human; it penetrates under the maxillary bone, and is the branch seen in the inner view of the head (*Fig.* 2, *k*), entering by a foramen, at the base of the skull; sometimes it gives the temporal vein. The next branch furnishes the masseter muscle, in company with an artery, called the *external maxillary*. The third large division gives, at times, the temporal vein, which is that seen in *Plate* (*vide f*); it passes under the spine of the maxilla, and anastomoses principally with the external branch of the internal maxillary. The other branches of this third division pass up to the occipital bone, &c., and give rami to the inner part of the skull at the cerebellum.

The Posterior Cava.

The blood is returned from the lower extremities, from the abdomen, and from the thorax below the heart, by the vena cava and vena porta. The vena portarum returns the blood of the chylopoietic and assistant chylopoietic viscera, which are those particularly concerned in the formation of the chyle, and the cava returns that from all the other parts. The *vena cava posterior* is sent out from the posterior and lower portion of the right auricle, having but a very small part of it contained in the pericardium. It gives first the *coronaries*, which return part of the blood of the coronary arteries; as it proceeds it is continued on the right side of the spine, inclining rather towards the aorta. As it passes through the tendinous portion of the diaphragm, rather to the right side, it gives two or three branches to this muscle; from whence it proceeds through the great sinus of the liver, where it receives the hepatic veins, which are indefinite in their number, but always numerous and considerable. From the liver, the cava is continued to the loins, approaching the aorta, where it receives the *emulgents*, and the *right spermatic*; the *left* usually enters the left emulgent, to avoid the disadvantageous course it must otherwise pursue. In the mare the spermatics are given to the ovaria, but, in the horse, they accompany the artery out of the abdomen with the spermatic chord. The emulgents usually give the *renal veins*, which receive the blood from those glands. The *lumbar veins* then accept the blood given by the arteries of that name.

The cava having arrived at the termination of the lumbar vertebræ;

bifurcates, from which results the *external* and *internal iliacs*. The internal furnish the pudicæ internæ, and sometimes the veins of the penis, which receive the blood distributed by the corresponding arteries. They likewise usually furnish the *sacral veins*. The external iliacs give numerous branches answering to those from the arteries of the same name: the *uterine* arise from them, which usually give a branch that is ramified on the tunica vaginalis of the testicle. Other branches are the *glutei*, the *obturatria*, and *pudicæ externa;* and a particular branch to the muscles of the abdomen, as well as the mammary in the mare. Passing out of the abdomen with the psoas muscle, under the Fallopian ligament, the external iliac takes the name of crural in company with the artery.

The *crural vein* accompanies the artery out of the abdomen, when passing between the pectineus and sartorius muscles, it first gives a branch that principally forms the superficial set of the posterior extremities, called *saphena major*, and a smaller one on the outer side, not always present, called *saphena minor*.

The *saphena* appears along the internal part of the thigh, just under the skin, giving branches to the integuments, one of which is considerable; likewise a branch communicating with the posterior tibial, then passing down the inner side of the leg, it usually receives a considerable ramus from the anterior tibial, and is now carried obliquely on the inside of the hock, over the inner condyle of the tibia; at which part, passing over the bursa mucosa, it is liable, on the diseased enlargement of that capsule, to become varicosed, forming what is called blood-spavin: from this it gains the canon posteriorly in a similar manner with the artery, on the outer side; where piercing between the large and small metacarpals, it unites with the posterior tibial, giving branches to all the surrounding parts, and to the canon, pastern, and foot.

The *little saphena*, when present, receives the blood from the external side of the hock and tibia, which it pours into the saphena major. The crural, or femoral vein, having gained the posterior and lower part of the femur, in the same manner with the artery, receives the name of popliteal.

The *popliteal* divides into two trunks, which sometimes form each of them into two or more branches, distinguished by the names of anterior and posterior tibial.

The *posterior tibial* accompanies the artery, receiving branches from the surrounding parts, and passing in a groove of the calcaneum with the tendon of the perforatus muscle (see *Fig.* 1), where the nerve is seen that accompanies it, though the vein is not, but which shews its course. From its passage at the posterior part of the hock, it gives branches to the surrounding parts, and receives the name of *internal metacarpal*. It is then continued down the posterior part of the canon, towards the inferior of which, it receives the saphena, and then dividing with the artery, forms the pastern veins, in the same manner as in the fore extremities.

The *anterior tibial vein* accompanying the artery, passes with it

under the edge of the extensor longus pedis. In this course it gives a branch to the saphena, and then furnishing the anterior part of the hock, it passes down under the ligaments to its posterior part on the outer side, from whence it is called *externai metacarpal.* It gives in this course branches to the surrounding parts, and is continued to the pastern and foot, but principally to the canon and pastern.

The veins of the feet are liable to become varicosed from pressure, and from inflammation, as in strains, grease, &c. From grease they are very liable to become diseased; when the cutaneous ones are at times totally destroyed; and the others consequently much distended, which must likewise tend to aggravate the disease itself; the returning blood being carried on still more slowly: nor is it improbable that a varicosed state of these vessels may be one of the causes of grease.

The Vena Portæ.

The *vena portæ* is formed from the veins returning the blood of the viscera, concerned in the formation of the chyle; as the stomach, the pancreas, the spleen, the omentum, the mesentery, and the intestines. The branches by which the blood from the different viscera is returned, correspond with the arterial trunks by which they are furnished; but are more numerous, and their diameter enlarged. Having united, they enter a sac, called the sinus of the vena portæ, from the other end of which, branch out the other trunks that carry their visceral blood into, and throughout the liver. The trunks that bring the blood from the viscera, are called the *abdominal portions* of the vena portæ, while those carrying it directly into the liver are termed the *hepatic portions* of the same vein. From this it is seen, that the vena portarum performs the office of an artery; resembling it by its termination in exhalent orifices, and corresponding recipient veins. The blood deprived of its bile in the pori biliarii is returned by the extremities of another set of veins, which are termed the *venæ hepatica*, and which terminate in the vena cava, as we have noticed. In the human, and in all quadrupeds that we are acquainted with, but the horse and ass, there is in the fœtus a communication between the sinus of the vena portæ and the vena cava, by a canal termed ductus venosus: but in the horse and ass this is wanting, and all the blood of their viscera circulates through the liver in the fœtal state.

General Remarks on the Vessels.

The blood vessels are liable to diseases. A very general one affecting the arteries is the *distention* they experience under inflammation, when the capillaries are made to receive red blood. This forms the most general affection to which they are subject, for they are but little liable to *aneurism*, or *ossification* in the horse, though now and then both have occurred. They are liable in common

with other parts to injury, as from wounds; in which case they may either be simply punctured, or their whole trunk divided. We have before remarked, that from the greater degree of tenacity of life, and the superior quantity of muscular coat to the arteries in the horse, the division of a very considerable branch will not prove fatal. An artery wholly divided is less dangerous than one partially so, because, when wholly divided, it recedes under the integuments, and contracts. The division of a vein likewise is not so dangerous as that of an artery, as it usually gives way to pressure, or to applications producing coagulation in the external orifice; but which coagulation does not so readily take place in the arteries, from the greater impetus in the blood, and the rapidity of its motion.

The veins are liable to two diseases; one arises from a preternatural enlargement in their coats, forming *blood sparin*, which does not appear usually an original affection, but is brought on by a dilatation in the mucous capsule of a part under the vein. The other common disease of veins is an *inflammation of their coats*, usually the morbid effects of blood-letting. These different affections will be fully treated of, when we enter on the diseases.

It has been a very antient custom among ignorant farriers, to take up the veins in different diseased affections; or what they term to *bar a vein*, particularly in œdematous swellings. This practice is founded in ignorance; for in grease, scratches, inflamed eyes and feet, which are the usual cases in which it is done; it is evident, that every thing that obstructs the return of the blood must highly aggravate the disease: but if, instead of destroying a vein, they could add two or three, they might do much towards a cure.

The arteries and veins are sometimes purposely wounded for the discharge of their contents, by which the column of blood is lessened. This is termed *phlebotomy*, or *blood-letting*, and is either local or general; the different modes of which we shall treat of in another place.

The *course* of the vessels of the body is admirably adapted to their various uses and capacities: the arteries, as being highly important, and not to be wounded with impunity, pass deep, and seek the most protected course. The veins are wisely of two orders, a superficial, and a deeper seated set. By the superficial order, when from strong action the muscles have become so distended as to press on the deeper trunks, the blood is carried forwards. This appearance judicious painters always express when they depict a horse either in action, or immediately after it; by which nature is followed, and great force, beauty, and strength, given to the representation. But ignorant painters seeing this, have fell into great error; for it is not unusual to see two portraits of the same horse, one under circumstances of the greatest exertion, the other perfectly at rest, with each the same number of superficial veins, swelled and prominent alike.

ABSORBENT SYSTEM.

THERE is a set of vessels in the body whose existence was for many centuries unknown, and whose use was not discovered for many more. The acquaintance with this system, called the *absorbing*, or *lymphatic system*; has led to the greatest improvements in our treatment of diseases, and thrown more light upon the animal economy, the circulation of the blood excepted, than any other discovery.

The *absorbents* are very small transparent vessels, arising in every part of the body, and all tending, as far as we know, to one common termination or deposit. As vessels, they contain fluids which are as various as the parts from whence they are derived. Hence they have gained a division into *lacteals*, or those from the intestines and mesentery, carrying *a milky fluid;* and into *lymphatics*, or those of every other part of the body, containing *a limpid fluid*. Absorbents, though almost transparent, are nevertheless very strong, and appear, from the experiments of Mr. Cruikshanks, to have two coats, one of which is supposed muscular: hence they are capable of great distention, and yet will recover their original size. Their valves are very numerous, and have been demonstrated as being semicircular, disposed in pairs, and at some distance from each other. In brutes these valves make the absorbents appear in some instances like a chain, when they are distended with fluid. In all the larger quadrupeds, this system is very large and strong, particularly in the horse: thus we see very considerable swellings in the legs very soon removed by rubbing, or exercise. From circumstances, we have reason to conclude, their living powers great; for they are highly sensible under inflammation; this we are aware of, by a distention of their coats forming a rising hard line under the skin, and which is excessively painful and tender to the touch. When wounded also, they become inflamed to a high degree.

The *lacteal absorbents* are that part of this system that is situated in the mesentery and intestines. They arise from the inner surface of the intestines, particularly the small ones, by means of the villi, which appear to be nothing more than the numerous orifices of these small vessels, from which they pass obliquely through the coats to gain that part to which the mesentery is attached, uniting as they proceed into larger branches, which are continued through conglobate glands situated in it, and thence called mesenteric: during which course they are called *primary*, or *original lacteals*, *vasa inferentia vel lactea primi generis*. The *mesenteric glands* are of different sizes and numbers; and in some animals, as the dog, are not dispersed, but connected into one glandular mass, called the *pancreas Asselii*, from its discoverer. As the lacteals pass out of these glands towards the thoracic duct, they are called *secondary*, *vasa efferentia vel lactea secundi generis*. Those of the small intestines proceed to the roots of the mesentery, where, uniting into an indefinite number

of considerable trunks, they accompany the mesenteric artery, *as is expressed in the plate of the viscera;* from which they descend by the side of the aorta, and terminate in the receptaculum chyli. Those of the large intestines, and which are very numerous in the horse, arise by trunks that pass up the vertebræ with the aorta, and enter with the lymphatics. The power by which this absorption is effected, has been variously accounted for. It is sufficient, however, to our present purpose to know, that it does take place; and that by these means the nutriment is sucked from the food taken and carried into the system.

The *lymphatic absorbents* appear not materially to differ from the lacteals, but in their situation. These absorbing vessels have likewise their conglobate glands through which they pass; and the existence of these glands is so constant, that we are led to suppose the lymph undergoes some material change within them. There are some considerable ones always situated in particular parts, as in the axilla and groin; and there are others smaller dispersed over the whole body. The *lymphatic glands* of the horse appear more liable to disease than the *mesenteric;* but in the human it is the reverse. These glands are very vascular, and appear more disposed to inflammation than the vessels themselves, as we see by the absorption of some morbid poisons, which will occasion abscesses in the glands without affecting the vessels by which they passed, as in farcy.

The knowledge of the functions of the absorbing system is of the utmost consequence to our practice in the healing art. Till this was known, not only were we unable to account for many appearances that we now know the cause of; but we were unable to bring about many effects in the constitution, now perfectly under our command. By the lymphatic absorbing system, the most surprising changes are effected in the constitution. From numerous facts, we are certain that the various organs of the body are continually changing, wholly or partially, their component parts, either for renovation or alteration. It appears the office of the arteries is to carry, form, and deposit new parts; but the old ones are first of all pulled down and removed by the absorbents. By this wonderful power the alveoli are removed, when their sharp edges would injure the gums; the roots of the temporaneous teeth are absorbed that they may be easily taken away; the gubernaculum testis, having fulfilled its office, is absorbed; the thymus gland likewise. The vascular cartilages are removed by the absorbents, to make room for the bony deposit when the animal approaches maturity. By these likewise both the solids and fluids continually change, and are carried back into the mass of blood, and afterwards become re-deposited by the same arteries. It is by these that ulceration is carried on, coagulable lymph taken up, and extravasated blood removed. By these it is that splents and other bony swellings disappear, when these vessels are stimulated to unusual action by fire or blister.

There is no part that we know of that is deprived of these vessels: they are not to be seen in the brain, but from the effects produced

there is no reason to doubt their existence. This being the case, it will necessarily form a superficial and a deeper seated set: one common to all the solid parts and cavities, and another more immediately appropriate to the skin, surface, and superficial parts. The first, it is evident, must principally act on the body itself, the others receive substances from without. The whole surface of the skin seems pervaded by two orders of vessels, or of openings; one whereby exhalation is going on and parts carried off; and another where substances are received, which are the orifices of the absorbents. By this latter order it is supposed oxygen is absorbed into the system. In insects we know that it is, as the smearing their surface with oil will destroy them, by preventing this necessary absorption. By these vessels, spread over the skin, humidity is taken in from the surrounding atmosphere; and hence horses at grass do not require much water, and especially if not exposed to the heat of the sun, whereby evaporation or exhalation is promoted. It is by this absorbing power that some animals, as rabbits, &c., do not drink at all; taking all their aqueous nutriment from the skin and edibles. Hence likewise unfortunate mariners, deprived of fresh water at sea, wrap garments wet with salt water around them; when the absorbents having the power of refusing in a great measure the salt, take the aqueous particles alone, and thereby lessen the thirst.

Practitioners in medicine, of the present day, have made the knowledge of this power in the absorbents greatly subservient to their use, and frequently employ this superficial order for the introduction of various substances into the system; some of which we could not so conveniently do by the stomach; and it is not improbable, that there will be great future improvements in this practice.

We have hitherto spoken only of the *healthy* and *ordinate action* of these vessels: but there appear circumstances under which they have an *unhealthy* and *inordinate action;* and which forms one of the strongest reasons why absorption is not to be considered as an act of capillary attraction: if it were, their capacities would ever remain the same; but we on the contrary find, that sometimes they scarcely act at all, while at others they are empowered with even too much energy; and, as a farther proof, we are enabled, by various means, to stimulate or rouse them to increased action. It has been supposed the diabetes originated in a disease in the lymphatics, whereby too great a quantity of fluid was absorbed; hence oil was directed to be rubbed on the surface; but though this disease is now differently accounted for, yet we are aware that the skin at times is disposed to take up an increased quantity of moisture.

Morbid poisons are known to be absorbed by these vessels; and it is farther probable that a peculiar state of them exists at particular times, when they are more disposed to take up noxious substances; as deleterious gases, morbid contagions, &c., than at others. As these vessels at times exhibit a more than ordinary energy, so at others they seem almost inert; hence in some horses there is a constant watery deposit in the heels and fetlocks, from which one might judge that the absorbents have not sufficient power to carry it off:

for though the deposit may be occasioned by an increased action of the arteries; yet the action of the absorbents is evidently defective in these instances, as we know by the effects that arise when they are artificially stimulated by exercise or friction.

The means by which we can excite these absorbents to increased action are various. Mechanical friction is one of them: hence it is that rubbing the legs proves so beneficial in removing œdematous swellings: for the same reason, some farriers beat a splent before they put on a blister. We can likewise stimulate these vessels by mercury; thus we apply various preparations of this metal to splents, spavins, &c., whereby the bony deposit is removed. Pressure also stimulates them; from which it is that we girth horses tight to promote absorption of the adeps and interstitial fluid. Cantharides has also an effect upon them: thus we blister swellings, exostosis, &c. And, lastly, one of the strongest stimulants that we know to this system, is the actual cautery; from whence arises the very common and free use of fire in veterinary practice, to all obstinate and diseased enlargements; and from experience we are aware that it is the most powerful means of promoting absorption that we are acquainted with. There is likewise a strong sympathy between the stomach and the absorbent system at large, whereby nauseating medicines increase their action powerfully. But of this we are not enabled to avail ourselves in the animal in question, though we might to kine, sheep, &c.

The *lymphatics of the hinder extremities* arise within the coffin around the laminated substance; they pass up on each side of the pastern in separate trunks, and continue up the canon on the outer side of the ligaments; when arrived at the hock, they join the inner side, receiving branches from the outer: here their trunks, which are numerous, pass up the inside of the thigh in several considerable trunks till they reach the inguinal glands, which are situated in the groin near the scrotum in the horse, and the bag in the mare. The lymphatics of the penis and muscles of the abdomen, are poured into them here, from whence the whole pass out from the inguinal glands, and enter the abdomen with the crural vessels. The glands of the groin vary in number and size, and it is worthy of remark, that there are but few, if any, lymphatic glands of moment between the feet and groin. Independent of these, likewise, there are some *deeper seated lymphatics* that follow the course of the deep-seated vessels, and unite with the others in the inguinal glands. When the whole, therefore, are arrived within the pelvis, they receive ramifications from all the parts within, and from without likewise: when accompanying the aorta in several considerable trunks, they enter the receptaculum chyli. Besides the lacteals, the abdominal viscera, it must be evident, furnish very numerous lymphatics.

The *lymphatics of the head, neck, and fore extremities*, are all of them a superficial and a deeper seated set. In the head they arise from all its parts, and pass down the neck; some accompany the carotid artery, others are situated more superficially. Those of the fore extremities arise as those of the hinder, and are continued, *a*

deeper seated set with the artery, and a *superficial order* on the inner side of the arm; both of which reach the axillary glands, which are situated in the neck, just before the rib, where the saphena vein originates: passing through these glands, they terminate by one or more large trunks at once into the chylous receptacle.

The *thoracic duct* is formed usually of an enlargement termed *receptaculum chyli*, which is nothing more than the united trunks of the lacteals and lymphatics. This receptacle is by no means of a definite appearance or size; sometimes it is hardly bigger than the duct itself: at others it is very considerable, and in some instances it has been found divided into two or three trunks, which at length form the duct itself. The duct is situated upon the vertebræ, near the emulgent arteries, and is continued up between the vena arygos and aorta, as well as between the crura of the diaphragm, where, passing under the aorta, it is received obliquely into the left jugular vein, or sometimes into the junction of the jugular and axillary. Red blood has been found within this duct in asses, from whence there is reason to suppose that absorbents sometimes arise from veins.

Thus I have in some measure attempted to describe the structure and functions of this very important set of vessels; and I would here remark to the student, that any attention he pays to this curious subject will amply reward him for his labour and research. By the discovery of the absorbents, many of the most puzzling phenomena become easily comprehended, some of the most obstinate diseases are effectually checked, and many of the most gross errors rectified.

Sect. XIII.

NEUROLOGY.

THE *nerves* are white masses sent off from the brain, some of which proceed out of holes in the cranium from that viscus itself; others arise from a large mass called the spinal marrow, which extends down the vertebral canal, and gives off trunks through the vertebral holes. The nerves in themselves appear long whitish cords, whose internal structure is fibrous, and whose fibrillæ are distributed to every part of the body. It is supposed that the brain is the seat of sensation, and that the nerves are only the messengers of it to all the parts.

The *sensibility* of a part is usually proportioned to the quantity and size of the nerves it possesses: it is evident, therefore, they must exist in far greater plenty in some parts than in others; thus they are large and numerous in the panniculus carnosus, which it is necessary should be highly sensible to shake the skin on any approach of noxious insects. Nervous influence is the occasion of another very

important phenomenon, which is that of motion. Not only the sensation of a part, but its mobility also, is lost upon dividing the nerves going to it. The *mobility* of parts, brought about by nervous influence, is in some dependent on the will, and in others it is independent of it. In the one instance it is termed *voluntary motion*, in the other *involuntary motion*.

Nerves are capable of re-union after they have been divided; that is, a substance is interposed between, possessed of the power of carrying on nervous influence. Dr. Haighton, the ingenious lecturer on physiology, made a division of the crural nerve of a dog, in which operation I assisted: in six weeks, the sensation and mobility of the limb, which had been rendered senseless and paralytic by the operation, were again complete. On dissection, an interposed substance was found between the divided ends, larger in circumference, and slightly differing in structure; of this I made a drawing, which was presented to the Royal Society, accompanied with a memoir of the experiment, by the ingenious professor. From other experiments, conducted by the same gentleman, it seems decided, that nerves may be re-produced.

If any part of the spinal marrow is compressed or torn through, the parts beyond the injury are rendered inert: if this happens above the origin of the phrenics, the animal is destroyed immediately, because respiration is totally suspended. The nervous cords are furnished with blood vessels which ramify on their surface; but red blood is not ordinarily circulating within them. The structure of these nervous cords, deprived of the surrounding cellular substance, is not possessed of much elasticity. They are usually so placed as to pass in the most protected manner, the larger branches generally accompanying the deep-seated arteries.

Nerves, when they have divided into branches, frequently again unite into a species of knot which is called a ganglion, and from which, branches are again distributed to the parts around. As these ganglions are almost confined to the nerves communicating with, or jointly formed from, the great sympathetic, and going to involuntary parts; it has led to some peculiar ideas of their uses. The nerves of young animals are said to be larger and more numerous than those of older, and hence their irritability is greater: from which reason they have much fat, to protect these nerves from too great irritation.

Nerves may be stimulated into action by various means, but nervous susceptibility becomes lessened by the continuance of stimuli. The irritability of some nerves is such, as to produce a quick exhaustion of that something whereby their phenomena are produced; hence fiery horses are seldom found lasting; and from this it is that diseases of increased action end in debility.

We have no reason to suppose there are any of those diseases termed nervous in the animal in question. The only active disease we know the nerves of the horse are subject to, is locked jaw; which seems an increase of the action of the brain, or of that action which

communicates nervous energy to the muscular fibre: hence pressure on the brain has been found for a short time to relieve it.

The Cerebrine and Spinal Nerves.

The *cerebrine nerves* are those which immediately arise from the brain, and are usually considered as nine pair of original trunks, which proceed out of the skull by different passages, through openings in the bones, and are principally distributed to the various parts of the head.

The *first pair*, or *olfactory*, are large and hollow, composed of both the cortical and medullary portions of the brain; they arise from the anterior and inferior part of this viscus, passing out by the holes in the cribriform portion of the ethmoid bone: and are divided into a number of small filaments which pass through the numerous ethmoidal holes, to be spread very thickly in a reticular manner over the surface of the pituitary membrane; giving by these means the great acuteness in smelling, this part possesses.

The *second pair*, or *optic*, arise in firm cords behind the former, from the two eminences proper to them, called *thalami nervorum opticorum:* passing forwards they unite near the pituitary gland, where again separating, they leave the skull by their proper holes in the sphenoid bone, in company with the ocular artery, passing from behind forward to enter the orbit, when they penetrate the globe of the eye, and are expanded into a fine layer, or web, lining all its inside to within a little of the edge of the crystalline lens; and which expansion is commonly known by the name of the retina.

The *third pair*, or *motores oculi*, are small branches, that arise from the medulla oblongata near the sella turcica: they accompany a branch of the fifth pair out of the skull, and are distributed to the muscles of the eye.

The *pathetici*, or *fourth pair*, are likewise small nerves arising from the cerebellum, near its junction with the cerebrum: they also accompany a branch of the fifth pair of nerves, and are spent in the oblique muscles of the same organ.

The *trigemini*, or *fifth pair*, rise from the annular processes of the cerebellum, and pass out of the skull in two large trunks, which are then called the *anterior* and *posterior maxillary branches*. The anterior maxillary passes out by the anterior maxillary foramen, and divides into two trunks, one of which is the *ophthalmic*, and the other forms the *anterior branch* of the anterior maxillary. This has given rise to the terms first, second, and third branches of the fifth pair of nerves; each of which branches has numerous subdivisions. The *ophthalmic* enters the orbit, connected with the sixth pair, and is divided into several rami; one of which furnishes the muscles of the forehead; another branch is given to the lachrymal gland, and two or three others to the parts within the orbit. The anterior maxillary branch gives a ramus that penetrating the palatine foramen is distributed to the palate, giving some nasal ramifications. The main trunk then entering the anterior maxillary

canal, furnishes the molar teeth with ramifications in its passage, again comes out at the anterior maxillary foramen, and is finally distributed to the muscles of the lips.

The *posterior maxillary branch* goes out of the skull at the base of the petrous portion of the temporal bone; having given off a twig to unite with the intercostal, it divides into several ramifications. The first of these forms the *lingualis*, which is distributed to the tongue; another branch passes by the sigmoid groove of the posterior jaw; a third is ramified into the substance of the spheno maxillary, and digastric muscles. The fourth principal division furnishes the parts about the fauces, salivary glands, and molar muscles. The fifth division passes along the internal surface of the posterior jaw, and enters the posterior maxillary canal; furnishing branches to the teeth: the remainder passes out at the foramen, at the symphysis of the skin, to be distributed to the muscles of the lower lips, and parts adjacent.

The *sixth*, or *abducent pair*, arise from the base of the annular processes, pass with the fifth pair, and enter the orbits to be given to the abductor muscles of the eye.

The *seventh pair*, or *auditory*, arise from the lateral superior part of the medulla oblongata, dividing each into two portions: that called the *portio mollis*, enters the auditory foramen in a soft pulpy form, and is distributed to the internal ear. The *portio dura* comes out at the base of the petrous portion of the temporal bone in a firm cord, part of which is given to the parotid glands, and subjacent parts; but the most considerable ramus unites with a branch of the posterior maxillary nerve, when it passes over the posterior jaw, upon the surface of the masseter in divisions, spread like the sticks of a fan (*see Plate of the Head*), some of which are sent to the muscles of the anterior; and the rest to the parts belonging to the posterior jaw.

The *par vagum*, or *eighth pair*, arise from near the base of the corpora olivaria, at the extremity of the medulla oblongata in disgregated fibres, and as they come out of the skull they meet and receive each a nerve, formed from the spinal marrow, termed *nervus accessorius*. The par vagum, thus jointly formed, as it leaves the skull, either again parts from the nervus accessorius, or a branch is given off from the united trunks of the two nerves, which uniting with the intercostal, is distributed to the muscles and parts about the pharynx, larynx, and upper parts of the neck. The *eighth pair* then descend along the external side of the carotid arteries, and as they enter the chest give off another branch, called the *recurrent*, from its peculiarity of returning and passing up the neck, close to the carotid artery, to be ramified into the larynx. If this nerve is divided on each side, the animal is rendered incapable of making any effort with his voice. Both this nerve and the eighth pair have communications throughout their whole course with the intercostal, or great sympathetic, and these unions form different plexi, which we shall describe with that nerve. After the recurrent nerves are

sent off, the *eighth pair* are continued with the œsophagus, giving filaments to that and to other parts in their passage: when having gained the stomach, they are distributed on its surface, and in conjunction with branches of the intercostal they also form the great semilunar ganglion.

The *intercostal*, or *great sympathetic*, is a nerve of a peculiar kind, called *intercostal*, from its situation; and *sympathetic*, from its connexion and effects: for it is by means of this nerve, that such extensive sympathetic effects are carried on between different parts of the body; which are, however, more observable in the human than in the brute, though the anatomical situation of both seems the same. The intercostal nerve appears to arise within the skull, one to each side, and from some united branches of the fifth and eighth pair, and probably from some rami of some of the others: soon after its origin, it is forming by its union with the ninth and some of the first cervical nerves, the first ganglion, which gives branches to the muscles of the larynx, pharynx, and neck. It is then continued down into the chest, forming, as it goes, communications with the cervical and vertebral: as it enters the chest it forms a ganglion, by which branches are sent to the heart, uniting with rami giving off from the eighth pair. It likewise forms, conjointly with the eighth pair, and with some filaments from the dorsal nerves, another ganglion given to the lungs, and parts within the chest. After this, passing through the left foramen of the diaphragm, it forms, in company with the fifth pair, the coronary plexus, which as we have mentioned is distributed on the stomach, from whence it is continued through the abdomen, furnishing it, by its union with the dorsal and lumbar nerves, numerous ganglions and plexi, which are named according to the parts to which they are sent, as the *hepatic*, the *splenic*, the *great mesenteric*, the *renal*, and *posterior mesenteric*, and *spermatic plexi;* by which it will be seen how extensive is the communication of this nerve; nor can we be surprised at the common consent these parts must act with, when the nervous communication between them is so intimate.

Nervi suboccipitales are a small pair sometimes considered as a pair of the spinal nerves, at others reckoned as the tenth pair of the cerebrine. They arise from the extremity of the medulla oblongata, or beginning of the spinal marrow, and passing out by the occipital holes, are distributed to the muscles of the head and neck.

The Spinal Nerves.

The *spinal marrow* is a continuation of the brain which passes down enveloped by a strong covering within the great foramen in the vertebræ, giving off on each side as it passes a nerve from the holes we have described, as formed by a notch left in the bodies of each of these vertebræ; consequently the number of these pairs of spinal nerves correspond with the vertebræ themselves, and their names are likewise similar. Hence there appears, *seven cervical, eighteen dorsal, six lumbar,* and *five sacral nerves.*

The *cervical nerves* communicate with each other in their whole course, arising each by little fillets from the spinal marrow, which uniting, form a strong cord. These cords furnish the external and internal parts of the neck and withers; and from some of the first of them are given off rami, that together form the *phrenic nerve*, which entering the chest posteriorly is continued along the pericardium to be distributed to the diaphragm *. The more posterior of the cervical nerves in conjunction with two or three of the first dorsal, and with a branch from the intercostal, form a large ganglion, which gives eight or nine cords, forming the external and internal humeral, the axillary plexus, and the ulnar. The remaining cords are distributed to the muscles about the withers and shoulders, and plentifully to the panniculus carnosus and skin.

The *external humeral* passes down the inner part of the humerus till it is near the bottom of that bone, when it turns towards the outside of the arm, extending down the anterior and outer parts of the cubitus, to be ramified into the muscles of the leg and foot.

The *ulnar* (*vide Fig. 2 of the Anterior Extremities*) passes over the olecranon on the inner side, to be distributed to the flexors of the canon and foot, running down with a branch of a vein distributed in the same manner.

The *internal* (*vide the same figure*) proceeds with the artery and vein of the same name, over the inner condyle of the humerus, when it takes the name of *radial*, and passes in company with the vessels behind the knee, and under the flexor tendons of the foot, upon the suspensory bifurcating ligaments, still continuing with the artery and veins, giving branches in its passage to the surrounding parts, and in this course receiving the name of *metacarpal:* it at length divides with the artery and vein into the *pastern*, or *lateral nerves*, in the same manner with those vessels, and is finally ramified into the foot.

The *eighteen dorsal nerves* are given off from the spinal marrow in pairs, through the holes formed by the notches at the extremity of each dorsal vertebra: they pass between the ribs, and communicate freely with each other in their passage, whereby respiration is promoted: they assist in forming, by the first and second branches, the nerves of the fore extremities; they have likewise an extensive communication with the intercostal. In their passage they detach filaments that furnish the panniculus carnosus, and muscles of the back; and likewise some inwardly to be spread on the inferior layer of intercostal muscles: thus gradually sending branches in their passage between the ribs, they finally lose themselves in the surrounding parts; those most posteriorly furnishing the abdominal muscles.

The *lumbar nerves* are six pair, given off in the same manner as

* From this origin of the phrenic nerves, we understand why a division of the spinal marrow below those vertebræ, from whence they arise, does not immediately kill; and why what is termed a broken neck is instantly fatal.

the former, which all communicate with each other, and with the intercostal; by which they assist in furnishing the viscera of these parts and of the pelvis. The first of these, communicating with the last dorsal, sends branches to the muscles of the back, and internally to the abdominal, to the psoas, and to the iliac muscles. The third, fourth, fifth, and sixth, unite to form in common with a branch of the intercostal, the *crural nerve*, which escapes out of the abdomen with the vessels, below the crural arch. There is likewise a branch formed, which may be called the *posterior crural*, or *obturator*, passing out of the obturator hole, and furnishing the obturator, and other muscles near the great trochanter.

The *crural nerve* gives branches in its passage to the inguinal glands, to the adductors of the femur, and continuing down is principally distributed to the muscles, and parts in front of the thigh: a twig is, however, sent down superficially on the inner side of the leg.

The *sciatic nerve* is formed from the last lumbar, and the first three or four sacral pairs, and is very large; passing along the internal part of the ilium, and between the two layers of the sacro-sciatic ligament. In its passage within the pelvis it gives some branches; and as it passes out, it furnishes likewise the muscles of the thigh and scrotum: after gaining the posterior part of the thigh, it sends off two considerable rami, one of which is divided into the massy muscles of the buttock; the other carries itself forward to the front of the tibia.

The *popliteal*, is the continuation of the sciatic, and runs between the two heads of the gemini, accompanying the posterior tibial artery and vein, and is seen in this course (*vide* 4, *Fig.* 1, *Plate of the Extremities*), passing with the same artery and vein in the groove of the calcaneum, accompanying the metacarpal vessels receiving the same name with these vessels, and also bifurcating in the same manner with them into the two *pastern nerves*, which ramify in a similar way with those of the fore extremities.

The *sacral nerves* are in pairs, correspondent to the number of the pieces of the false vertebræ of which the sacrum is composed, and are given out by the holes in its sides. They communicate likewise with the intercostal; and the first three or four pair assist to form the sciatic nerve on each side. The remainder, as well as some filaments of the former, are distributed to the rectum, anus, bladder, and parts of generation in either sex. The penis is furnished by a considerable branch from them in common with one arising from the hypogastric plexus. The *remainder of the spinal marrow*, after this distribution, is very inconsiderable; however, what does remain, is given out at the extremity of the sacrum, and runs down the tail in two or three small branches.

Sect. XIV.

ADENOLOGY.

GLANDS are vascular bodies that are very numerous, and placed over every part of the body. They are of various sizes, some being very large, as the liver, and some very small. Their *figure* is also various, and their *situation* undetermined; some being deep-seated and within cavities, others being altogether superficial. The office which glands generally perform, appears to be to *secrete*, and form the fluids of the body, or to alter the fluids they receive: but in what manner either of these actions is produced we are unaware; nor is secretion proper to all glands, as is instanced in the thyroid, which does not secrete; other parts again secrete, that appear to have no glandular structure, as the capsular ligaments. Glands may be divided into *follicolose*, *globate*, *glomerate*, and *conglomerate*; though the follicolose are but a small species of glomerate. Glands likewise receive names individually, according to their office, as the *lachrymal*, *salivary*, &c. The *follicular* are small glandular bodies variously disposed, and appear either *sebaceous* or *muciparous*. The *sebaceous* are mostly situated on, or near the surface of the body, and appear composed of small arterial convolutions, by which a substance is formed, having some degree of solidity, and resembling suet, hence called sebaceous. *Muciparous glands* are described as small follicular bodies, usually situated in cavities and canals; secreting a mucus; as that of the nostrils, fauces, and urethra: but in many instances they are not very evident, and in some mucous membranes their existence even is doubtful. *Globate glands* are oval vascular bodies, receiving lymphatic vessels at one side, and permitting their exit at the other, but are destitute of any other excretory trunk; hence they are deemed peculiar to the lymphatic system. A *glomerate gland* appears one connected body of an indefinite shape, with an excretory duct; as the kidney, liver, &c. A *conglomerate gland* is a body composed of several glomerate glands, each of which has its proper excretory duct, uniting to form a large general one common to the whole, whereby the gland is connected, as well as by the cellular membrane; such are the salivary and pancreas. There does not seem to be any essential difference in the economy or functions of the glomerate or conglomerate glands; the convenience of situation appears to be studied more than any varieties in their office; hence, early in life, some are conglomerate that in the adult become glomerate. The glands of young subjects are said to be larger than those of older; and from the alteration in the kidney and thymus gland, we see that some change really takes place both in their size and figure during life. The nerves of glands are said to be few, and hence their sensibility is not considerable;

they are however plentifully supplied with blood vessels; and this usually in proportion as they are intended to secrete more or less; thus the vessels of the kidneys are very large. The blood usually is retarded in its course through glands by the structure and situation of their vessels: therefore their arteries are usually convoluted, and have a greater proportion of muscular than elastic coat, and their veins are without valves; by which formation the blood remains a longer time within the gland, to be more completely acted upon. All the secreting glands perform their secretion from arterial blood, but the liver, which separates its fluid from venous.

Many opinions have been formed on the subject of *glandular secretion*. It has been thought, that the immediate formation of the secreted substance depended on its previous existence in the blood; and that the glands only strained, or otherwise separated these component particles. The blood possesses the same chemical properties throughout; it therefore must be a living act of the glands themselves, or of the vessels within the glands: this opinion is farther strengthened by the various phenomena of vegetation. The sap of trees owns the same chemical properties, yet forms by the medium through which it passes, either wood, bark, leaves, blossoms, or fruit.

Glands are endowed with a considerable share of sympathetic effect; the kidneys form one of the strongest instances of this, whose sympathy with the skin is very great; thus when one acts in profusion, the other is lessened in its secreting effects. In summer, when the skin is in full action, and the blood pours out its aqueous particles in sweat in great plenty, little urine is made: but in winter the reverse takes place. As the circulation through a gland is increased, so is the secretion enlarged likewise; hence under the first stages of inflammation, glands secrete more, because the circulation is increased; but in the latter stages of inflammation, or when it exists in a great degree, the secretion is lessened, or totally stopped: for then the gland probably becomes, in a measure, disorganized, and unfitted for its functions.

Scrofulous and cancerous affections of the glands are very seldom met with in the horse.

Of particular Glands.

The *glands of the skin*, are little secretory bodies distributed over the surface, within, or under the skin, termed *subcutaneous glands*; which form a matter that furnishes the external surface of the body with a matter of a greasy nature, and is that which, on rubbing a horse's skin, makes the hand appear moist and greasy. When this is secreted in plenty, it is a sign of health; but when the skin and hair feel dry, it is the contrary.

Glands of the Head.

There are several glands in the cavity of the skull, or at least substances that are esteemed glandular; such as those of the dura

mater; those within the choroid plexus, &c. The *pineal gland* is a soft greyish body, situated above the *thalami nervorum opticorum*, and was by antient anatomists regarded as the seat of the soul: but though the moderns reject this idea, yet to them its use is equally unknown. The *pituitary gland* is a spungy body about the size of a chesnut, lodged within the *sella turcica*, at the posterior part of the brain, whose use is likewise unknown.

The *lachrymal gland* is situated within the orbit, at the superior part of the external angle of the orbitary fossa; it is a glomerate gland furnished with several little excretory ducts, which secrete a fluid that assists the eye in its motion, called the *tears*.

The *caruncula lachrymalia* is a small eminence placed at the side of the grand or internal angle, furnished with little excretory ducts, from which issues a peculiar fluid.

Meibomius's glands are small sebaceous bodies, situated under the inner skin of the eyelids, with their excretory ducts opening on the tarsi or edges of the eyelids, which are called *puncta ciliaria*; they furnish an unctuous matter to these parts.

Glands of the membrana nictitans are described as small bodies, with open orifices on this cartilaginous substance.

Glands of the nostrils appear to be small muciparous glands within the pituitary membrane, throwing out a mucus, whereby this surface is kept moist; moisture appearing very favourable to the proper sensibility of the nerves, and it is therefore found in most surfaces of exquisite sense: by which likewise it is probable, the effluvia is arrested in its course, and more permanently applied to the nerves: thus, in some cases, we perceive the smell of substances long after the substances themselves are removed.

Ceruminous glands of the ear.—The inside of the ears is furnished with numerous small glands, which secrete a waxy substance, whereby insects and dust are prevented from making their way to the membrana tympani.

Parotid glands are two considerable bodies situated on each side of the head, beginning at the base of the ear anteriorly from the zygomatic arch (*see Plate* IV), running around to the posterior part of it: inferiorly each has a triangular process, that runs on the upper branch of the jugular, and another portion fills up the triangular space between the upper and lower branches of this vein. It is a gland of the conglomerate kind, receiving little ducts from its several portions, which all pass into one considerable trunk that runs on its anterior edge, along the tuberosity of the posterior jaw; within the inner surface of which it proceeds down to the extremity of the tuberous ridge, when it comes from the inner side to the outer, and passes up in company with the maxillary artery and vein, and pierces the muscles of the mouth, about the second molar tooth. These glands are called *vives* among farriers, and any swelling in them is termed the same: if they should proceed to maturation, and from their great increase and proximity to the trachea, there is danger of their impeding respiration, it may become necessary to open them, in

which case it is evident the opening made should be distant from the anterior part where the duct runs, or the saliva will not only be lost to the mouth, but the sore will be rendered fistulous and difficult to heal. From what has been said, it is unnecessary to add, these glands are intended to furnish part of that diluting fluid termed *saliva*.

The *maxillary* are two considerable glands of several inches in length, situated within the branches of the posterior jaw, their upper part being near the condyloid process of that bone, and their lower pointed extremity occupying the angle, or rather beyond it; superiorly, being just within, and under the parotid glands. Their ducts pass one on each side, under the mylo hyoideus muscle, and under the tendon of the digastric, and penetrate the membrane of the mouth, about an inch and a half from the lower nippers, by an orifice proper to each, which projects up into a nipple-like rising. (*Vide Plate* III, *Fig.* 2, *n n.*) In inflammations of the mouth, it is common, with ignorant farriers, to mistake these for injurious and foreign bodies, and to cut them off, whereby they usually occasion a very serious complaint. Mr. J. Lawrence, in his publication, among other gross errors, recommends cutting the *barbs*, or *paps*, close.

The *maxillary lymphatic glands* are situated at the superior part of the branches of the posterior jaw under the skin: they pour their lymph into the cervical glands. La Fosse mistakes these, and which has thrown him into great error in his description of the glanders.

The *sublingual glands* are situated lower than these: their excretory duct penetrates the mouth at the lateral inferior part.

The *labial glands* are placed under the common membrane of the mouth, on the inner surface of the lips, and are small folliculose bodies.

The *molar glands* are on each side of the mouth, near the alveolar edge; and are also small bodies, whose excretory duct opens near the last molar teeth.

There are likewise glands placed within the mouth, at its posterior part under the membranes. The tonsils themselves are glandular substances. There are besides others, between the membrane of the velum palati, and some within the membrane of the palate itself, as well as some termed *laryngeal* and *pharyngeal*.

Glands of the Neck.

The *thyroid* is a large gland placed one on each side of the trachea anteriorly, immediately below the larynx. Its excretory duct has never been detected, and its use is unknown.

Besides these, the neck is furnished with small lymphatic glands in different parts.

Glands of the Thorax.

The *thymus* is a large gland, called by butchers the *sweetbread*, and is situated within the mediastinum, at the superior and anterior

part of the chest. Lymphatics have been seen traversing it towards the thoracic duct; but no excretory canal has ever been found. In the colt, and most young animals, it is very large; but in adults it becomes dwindled almost to nothing: hence we eat veal sweetbreads, but we never meet with those of beef. Its use is a matter of uncertainty.

The *bronchial glands* are two large dark glandular bodies placed near the bifurcation of the trachea, which are thought to secrete a humour to furnish the bronchia.

The *dorsal* are described as two glands, situated in the chest, near the aorta, at the fourth or fifth dorsal vertebra, whose excretory ducts have not been found, and whose uses are therefore doubtful.

Glands of the Abdomen.

The *gastric*, which are muciparous glands, discovered by Morgagnii, are said to be placed under the external membranes of the stomach; but whose existence is, by some, esteemed doubtful, and the appearance fallacious.

The *intestinal glands* are similar bodies under the internal membrane of that canal.

The *mesenteric* are the globate glands of the mesentery (*which see*). The *lumbar glands* are situated in the lumbar region, and belong to the lymphatics.

The *iliac* and *sacral* are lymphatic glands placed in the parts from whence they derive their name.

The *liver*, the *pancreas*, and the *kidneys*, are all large abdominal glands, whose structure will be described under *Splanchnology*.

The *renal glands* are bodies situated at the anterior extremity of each kidney, whose use is unknown, and whose duct has never been discovered.

The *spleen* is, by some, considered as a glandular body; but its duct has never been demonstrated: and, from its office being apparently connected with digestion, it is not properly so considered.

Glands in the Male Organs of Generation.

The *odoriferous glands of the glans penis*.—These are sebaceous glands, secreting a suety matter at the head of the yard, under and within the prepuce or sheath: when this has remained in too great quantities for any considerable length of time, it may occasion inflammation and ulceration.

Glands of the urethra are mucous glands, situated under the membrane of that canal, whose orifices within it are called lacunæ.

The *prostates* are glandular bodies situated near the membranous part of the urethra.

Cowper's glands are situated at the external part of the urethra below the former, opening by several small orifices into that canal; being externally muscular, and internally hollow.

The *vesiculæ seminales* are two bodies, now supposed to be glan-

dular, whose office, it is conjectured, is not to receive the semen, but to secrete a fluid to dilute it.

The *testicles* are two glandular bodies, situated within the scrotum, which secrete the semen: their excretory duct penetrates the urethra by the vesiculæ seminales.

Glands of the Female Organs.

The *odoriferous glands of the vulva and clitoris* are similar sebaceous glands to those of the male prepuce.

The *glands of the urethra* are situated within its inner membrane.

The *mammary glands* are a collection of numerous glandular bodies, divided into two portions. Each portion has a number of lactiferous tubes, which end in two teats, by which the milk, secreted within them, can be drawn out by the foal in the act of sucking.—See *Splanchnology*, where these and the other important glands will be again described.

Glands of the Extremities.

The *axillary* are numerous globate glands, collected into a mass of an oblong figure, situated at the anterior lateral external part of the chest, laying close to the axillary veins: they are united together by cellular substance, and receive the lymphatics of the anterior extremity, and some of those of the neck.

The *subscapulary* are likewise lymphatic glands, situated at the internal surface of the scapula, receiving the lymphatics of those parts.

The *inguinal* are globate lymphatic glands, situated within the thigh, receiving the lymphatics of the groin, and both these and the axillary may become inflamed in grease, or other sores producing an acrid discharge, the absorption of which irritates them frequently.

Sect. XV.

SPLANCHNOLOGY.

HAVING treated of those parts that enter into the formation and composition of the different organs of the body generally, we now come to describe the organs themselves individually: which we shall do by considering the animal in question, as made up of head, neck, chest, abdomen, and pelvis; with the anterior and posterior extremities. All these parts are invested by some general coverings, which must be first noticed.

The Common Coverings and Integuments.

There may be considered under these heads, the hair; the cuticle,

epidermis, insensible, or scarf skin; the rete mucosum; the cutis, sensible, or true skin; the membrana adiposa; the cellular membrane, and panniculus carnosus.

The *hair*.—Nature has kindly guarded most quadrupeds against cold, by an exterior covering called *hair*. Each hair is a little tube, whose bulbous end arises within the true skin from a kind of oval enlargement, which is connected with the membrana adiposa underneath. The hairs pass through the rete mucosum, and pierce the cuticle, and are continued out through these openings of various lengths and sizes; hence those of the tail are large and long, those of the eyebrows are strong, but not large; and those of the rest of the body are finer. The hair gains different names according to its situation, as *fore-top*, *mane*, *cilia*, or *eyelashes*, *supercilia*, or *eyebrows*; that on the chin, which is long and firm, is called *beard*.—(*See Exterior Conformation.*)

The *colour of the hair* varies very considerably; in some horses, it is wholly of one hue; in others, it is formed of a mixture of two or more colours. (*Vide Exterior Conformation.*) As this must arise probably from a particular disposition of the vessels, giving a certain arrangement to the matter of which hair is composed; so it may follow, that particular colours accompany certain states of the constitution; hence the hair changes in appearance in old animals, and between the periods of youth and the adult state. Some diseases change it likewise; as highly inflaming a part produces new hair always of a tint lighter than the original; for the part is in a state of debility. Though every light-coloured horse is not to be rejected, yet it does appear from experience that light hair is not a mark of strength or durability, but rather the reverse. It likewise is certain, that when the extremities are white, they are more strongly disposed to inflammation, to swellings, and to grease, than others which are darker: and the whiteness of the hoofs, it is equally certain, is not favourable to their strength. When the hair stares, it is considered as a symptom of ill health; but this does not appear to arise from any particular effect upon the hair itself, but upon the skin, from a want of secretion in the subcutaneous glands. Cold likewise produces a staring of the coat, which evidently arises from the contraction that takes place in the cutis. But there are also states of the cellular membrane of the skin, arising from internal affection, in which the hair stares, as it is termed: but, in addition to the appearance of the hair, the hide is bound.—(*Vide Hidebound.*)

The *use of hair*, in the human body, is in some respects doubtful, at least that of particular parts; in others its benefits are glaring: but in the brute its consequence is evident throughout; and as we find a harmony through the whole of animated nature, and certain similarities exist in all her gradations; and as man is but an animal of more noble structure; hair may be in him but as a connecting similitude between himself and his other brethren of the animal kingdom. Not to add, that the hair of the scalp was given for beauty; that of the eyebrows for expression; and of the eyelids for the pre-

vention of the attacks of noxious insects. The hair sympathises with the constitution and its wants; or the constitution at large has a power over the growth of the hair, whereby it makes it subservient to those wants: hence as the winter approaches, it lengthens very considerably, to serve as an additional covering and defence against that inclement season. In the frozen regions of the north, quadrupeds are universally clothed with long hair the whole year, of a fine warm texture: the coat of British animals taken there also, immediately becomes longer. The hair of some parts seldom exceeds a certain length, while that of others, as of the mane, tail, and fore-top, have no bounds to their growth. As, therefore, the more general covering of the hair has a determinate length; so, when nature wishes to give it longer, as a defence; the present coat falls off, and one with greater length is given: and when the returning warmth of the spring renders this additional covering unnecessary, the long hair falls off, and is replaced with a shorter kind. That this is a sympathetic effect between the skin and constitution, is evident from what takes place in horses who are artificially kept; that is, in those who are constantly immured in hot stables. For in them, as the change of temperature between winter and summer is hardly perceptible, from the additional heat that is usually given the stables at this time; so the constitution not wanting any increase to the covering, the summer coat either remains, or, if it is changed, it is for one with the same length of hair; and it has been to prevent the change of this summer coat, or to encourage the production of one of similar length, that has led to the custom of stabling horses with the degree of heat usually met with where the owners pride themselves upon the beauty and sleekness of their horses' coats. Not only do hot stables tend to prevent a long coat, and to produce a short one; but most stimulating substances likewise have the same effect; from which it appears probable that any thing that increases the circulation, has a tendency to produce it: hence horses, after strong exercise, shed much hair, which is an act of the skin to prepare for a future production; and hence wicked and idle grooms give their horses spice, and other stimulating substances, to promote the shedding of their long coat. In most cases the general covering of hair is changed each spring and autumn, and which change takes place rapidly; but even at all other times, the hair appears subject to the same change with other parts of the body; and, it is probable, that few individual hairs remain from the vernal to the autumnal, or from the autumnal to the vernal period. The general growth of hair appears a process that requires considerable powers of the constitution; hence horses, at the time of moulting, are usually weak, and, during that time, their pulse is slightly increased*. As the hair

* Animals who lick themselves are subject to have collections of hair, in the form of balls, within their stomachs; sometimes these collections have increased to such an extent, especially in oxen, as to incommode, and at last to kill; they are said to be particularly frequent in the chamois goat, called *Ægagropilus;* and in times of superstition and ignorance these particularly were used in medicine as a

appears to be a production of the true skin, so, if by any means that is destroyed, the hair is not re-produced; thus in blisters, when properly applied, the cuticle only is raised; but the rete mucosum and cutis remain entire: if the stimulating application is strong, the rete mucosum is raised likewise, yet the hair is not affected; but if the blistering matter acts very strongly, and the cutis is destroyed, a baldness ever after is the consequence.

The Cuticle.

Immediately under the hair is a firm insensible covering to the true skin, called *cuticle* or *epidermis*. The substance of the cuticle is by no means equally thick in every part: in some its substance is considerable, as on the back and extremities; and in others is very thin, as the lips, &c. It appears as in the human, to be much increased by pressure; hence I have found it of astonishing thickness on the rumps of asses, who are much exposed to be beaten on that part. Over the knees, the points of the elbows, and hocks, it becomes likewise much increased from pressure, and is also given thick to these parts. Within the fore arm, and on the inner side of the canon behind, it produces a substance not unlike horn, which grows to a considerable length, and is then removed in scales and re-produced. The cuticle adheres to the cutis or true skin, by means of numerous papillæ, which run from the cutis into its substance. These papillæ are thought to be the expansion of the nerves of the skin, the exquisite sensibility of which is modified through the medium of this substance. The cuticle may be separated by maceration and boiling in the dead subject; in the living, by frictions and stimulants, as cantharides. The cuticle covers the skin throughout its whole extent, except at the hoofs; and these, it is probable, are only a species of cuticle, or a secretion from the cutis.

It lines likewise many of the large openings made through the skin by the entrance of canals, as the mouth, where the cuticular lining is continued into the œsophagus, and over the first portion of the stomach. The cuticle is perforated by the sebaceous ducts, by the exhalent vessels, and by the absorbents. Through the exhalent orifices, the insensible perspiration passes off; and through the sebaceous ducts, which are evident to the naked eye, the cuticle

species of bezoar. The collections of concrete matter found within abdominal cavities, have been frequently mistaken for hair balls; and thus naturalists have regarded these as a peculiar formation, and a *lusus naturæ*: such appears to have been the case with the man, whose case Sir Hans Sloane gives in the Philosophical Transactions; where a substance, six inches in diameter, was found in the intestines of a person much troubled with colic, which, when viewed with a microscope, appeared made up of hair like the *tophus bovinus*; but which was only the appearance the concrete had assumed, having a plum-stone for a nucleus. Some hair balls are covered with a thin smooth coat or shell; some are naked, and shew the hairs on their surface, simply connected together by gluten. The shape and size of these balls are likewise various; but they are more usually round or oblong, and sometimes ten or twelve inches in circumference. Horses are not very subject to these hair balls, though now and then they do exist.

is furnished by an unctuous substance that keeps it soft and pliant, and gives it that greasy feel we are accustomed to. Blisters applied, irritate and inflame the true skin, and occasion so great a deposit of serum underneath, that the cuticle is forced up, and then it no longer remains pervious, and hence an accumulation of water takes place underneath; there is, however, in the horse seldom so complete a separation between the cuticle and cutis as takes place in the human blister, but the cuticle is raised in several parts into small bladders. The insensible skin appears formed from a real secretion of the true skin, and is almost endless in its re-production, forming in a very short time after its removal from a healthy surface.

The *corpus mucosum*, or *rete mucosum*, is a mucilaginous substance placed between the layers of the cuticle and cutis, the origin of which has not yet been explained, nor the use of the whole sufficiently demonstrated *.

The Cutis, or True Skin.

The true skin is a very general membrane, situated immediately under the corpus mucosum, of a firm texture, and apparently fibrous, but very vascular and sensible. It is this part, that among artizans is called *leather*, and we may from this judge of its strength and texture. It is not equally thick in every part of the body; but is kindly given, like the cuticle, thickest where the parts are most exposed. In the extremities it has great substance, particularly over the fetlocks, the knees, hocks, &c. as well as over the back, belly, and some parts of the head. It is connected exteriorly to the rete mucosum and cuticle, and interiorly to the fleshy pannicle and membrana adiposa. Its outer surface is garnished with numerous papillæ, which are small eminences extremely sensible, laying under the cuticle, and received into its depressions; and wherever the skin is most sensible, these papillæ are found most numerous and extensive. The true skin, like the cuticle, is perforated by numerous openings, which are the exhalent and inhalent orifices; and by the ducts of small sebaceous glands, situated immediately under the skin, in its adipose membrane. These openings appear in greater plenty in some parts than in others; as in the nose, ears, and parts of generation, which are full of them. The

* It is this mucus that gives colour to the skin of the human, and is in the European, white, or nearly so; in the African, black; in the Mulatto, copper-coloured; in a Gipsey, yellow; and white, in the Albino. It becomes likewise brown in those much exposed to the rays of the sun, particularly when reflected from the water, as in long voyages, or in sandy or chalky places. It is thought nature gave it black to the negro as a defence against the external heat, by preventing the rays passing through. There have been instances of this substance being absorbed in some parts of the body of a negro, and the cutis and cuticle have then remained white as in Europeans; but these instances are very rare. Under the internal layer of the rete mucosum, Mr. Cruikshank discovered a third lamen, which he has called cuticula quarta: he discovered it, by dissecting a person who had died of the small pox, and upon which lamen the pustules were situated: but this has by others been thought to be only a layer of coagulable lymph thrown out in consequence of the general inflammation.

skin must, it is plain, wonderfully protect parts from friction, and other injuries, as well as afford to the surface that high sensibility, so necessary to animal caution and safety. It appears possessed of great elasticity, as is evident in young animals who are growing, in animals with young, and in those suddenly reduced from fatness to leanness.

Sense of Touch.

A very principal use of the skin appears to be, that of becoming a medium through which objects are distinguished, by an application of the surface of the skin to them: by this extended medium, heat and cold, dryness and moisture, weight, and every other sensation capable of being imparted, are perceived: and by some particular parts, as the muzzle, or extremities of the lips, and by the toes, quadrupeds attempt to distinguish objects from each other particularly: and it is observed, that in such parts the cutaneous nerves are more numerous, and the cuticle thinner. The connexion between the skin and the brain is so intimate; and so exquisite is this sense in some brutes, and in some persons, that it becomes frequently distressing. In most, likewise, a sensation may be produced, that is not strictly pain, but is productive of the same effects; such is, tickling, of which horses are very susceptible.

Adipose Membrane and Fat.

The *adipose membrane* is a very considerable part of the body of most animals; but like the panniculus carnosus it cannot be regarded as a complete covering or investment, since many parts are without it, as the eyelids, ears, sheath, some parts of the extremities, &c. It appears formed of a number of membranous laminæ, so disposed as to form themselves into cells, neither the number nor the size of which are the same in all parts of the body: in the mesentery, omentum, and about the kidneys, they are large and numerous, and here appears a disposition in the contained substance to become of a firmer consistence; on the surface, the cells are smaller, and in the bones, where the contents are nearly fluid, they are very small. The cells of which it is composed do not appear to communicate, or the fat would gravitate; and this forms a very essential difference between the adipose, and the general connecting membrane. It is vascular, and has nerves and absorbents, and is likewise subject to the diseases attendant on vascularity, as inflammation and abscess.

The *fat* is an unctuous juice that is poured into the different cells of this adipose membrane, at first in a fluid form; from which it gradually becomes of a firmer consistence. It appears in greater quantity in some parts than in others, forming in the abdomen suet or lard, while that over the surface of the body, and within the bones, continues always more or less fluid. Different animals have their adeps of different degrees of firmness, from the firm suet of the ox, and the tallow of mutton, to the soft lard of the hog.

The *uses of this substance* appear to be several; it may be considered as a guard to parts; and its distribution strengthens this opinion: hence it is found covering the nerves and blood vessels, especially such as are in the neighbourhood of hard parts, and liable to pressure. It fills up most interstices, and thus adds much to beauty: this is instanced in the eye-pits, which in young horses are filled up with this substance. A second use is, that of lessening the irritability of the cutaneous nerves, which in young animals are very plentiful on the surface, and very irritable; we, therefore, find most of the adeps in early life distributed exteriorly, while that of older subjects is placed mostly within the cavities of the body. In quadrupeds of all ages, the omentum is very plentifully supplied with it, but in some more than in others; the quantity in the horse is proportionally small, and the use of it here is a little obscure. The kidneys of most are surrounded by it; in some they are completely imbedded within it; and throughout the whole abdomen it is found in considerable plenty, though less in the horse, as an animal destined for speed, than in some others. In all quadrupeds it fills up the interstices of the muscles, and is placed in the cancelli of bones, where it is termed *marrow*. Another very principal use is to form a depôt for the support of the constitution under the want of nourishment: hence much fatigue produces a rapid absorption of it. It is from this cause that animals who fast long, from the highest state of obesity, become wholly lean and impoverished; as in the torpid bear, who enters his wintry habitation surrounded with an immense quantity of adeps, but leaves it in the spring under the greatest emaciation, having been supported during his insensible state by the absorption of this large portion of animal oil, and not, as is vulgarly supposed, by sucking his paws, which are only wrapped around his nose, but never enter his mouth. Animals living a life of rest, appear to have a tendency to form this fluid, but not in an equal degree: in addition to a life of rest, there must be a particular disposition of the body, favourable to its production. In the brute, a particular form of the body is best adapted to the formation of fat; thus round carcases, arising from circular ribs, are favourable to it, by producing a large surface for the absorption of chyle: hence we see likewise, that nutriment is connected with it, but not peremptorily so; that is, some horses may eat much of the best food, and not grow fat.

Cellular Membrane.

This forms a very complete integument of the body, being situated in almost every part we are acquainted with, and is, like the adipose, formed of membranous cells, which freely communicate with each other by these cavities throughout the whole body; as we see from the nauseous practice of butchers, who blow up the newly killed calf from one point, till not only the surface, but even the viscera, become distended by the air. It is exemplified, likewise, by

a wound in the lungs, where a similar swelling and distention take place of the whole body, which is called *emphysema:* and likewise from wounds of the hock and ulna, when the same appearance occurs: from these facts we likewise find that it has a disposition to absorb air. It is, perhaps, a more general substance than is supposed, for it appears to me, that even ligaments are but a modification of it, with, perhaps, a peculiar arrangement of fibres; nor are aponeuroses, or tendons, very dissimilar. It exists in different quantities, and, perhaps, in various forms in different parts; in some it is strong and dense, taking on the appearance of ligaments: in others, it consists of the finest laminæ. It is the connecting medium between the skin and body; it enters into the interstices of muscles, connecting their fibres; it is likewise interposed between the various expansions, of which parts are made up, connects all the filamentary substances, and holds together the granulated: it is also vascular and elastic, and is the immediate seat of abscess. Anasarca has its seat within its cells; and it is a disease likewise of this membrane that forms what is termed hidebound.

The Panniculus Carnosus.

Providence having denied hands to quadrupeds, has given them in lieu a muscular expansion, extended nearly over the whole body, whereby they are enabled to corrugate the skin, to shake off dust, prevent the attack of noxious insects, and perform other purposes necessary for their ease and convenience. This *fleshy pannicle* is a thin muscle, found only in quadrupeds, and not in the whole of them; of which the porcupine, and porcine tribe, with some others, are instances: in the horse it is strong; but, in the ox, sheep, and dog, particularly so. In different animals its attachments are different, and, accordingly, its actions and powers become varied. In the horse it is most evident on the trunk, but, by its attachments, it can operate upon the extremities; and that portion that operates on the head and neck, agreeable to some other authors, we have described as cutaneous muscles of those parts. La Fosse describes all the portions of this investing pannicle, as four pairs of muscles proper to the skin.

The panniculus carnosus is not equally thick in every part; in some its muscular fibres are considerable, in others they are less so; and, in some, its attachments are simply aponeurotic. The muscular parts may be regarded as the centre from which the others are moved; and thus, as either of the aponeurotic, or extreme points may become fixed, so it is capable of acting in every direction. It acts to greatest advantage when the animal is at rest, because then the parts to which it is attached are fixed; these attachments are very numerous, and not easy to define. Anteriorly it is connected to those muscles, that, by their form and situation, are called the cutaneous muscles of the neck; and which, as we have before said, appear to act the part of a fleshy pannicle to the neck and head: it

is likewise attached to the muscles of the shoulder, and is extended down the front of the scapula, adhering very closely to the spine of that bone, its fleshy portion ending at the superior part of the arm; but its aponeurotic is continued into the similar expansion of the muscles of the fore arm, by which it can shake the skin of this part when necessary. Posteriorly, it extends its fleshy part backwards over the convex and middle parts of the ribs; but its aponeurosis adheres to the cervical ligament, trapezius muscles, and spinous dorsal processes: more inferiorly, it is attached to the pectoralis and latissimus dorsi, and is continued by a species of fold on the inner side of the aponeurosis, terminating with the latissimus dorsi, by which means it can act on the internal, as well as on the external, part of the arm. It is not continued completely over the false ribs, being attached superiorly, as we have shewn; when, making a kind of break, it is continued inferiorly and posteriorly by a strong aponeurotic expansion, covering the external oblique muscle, with which it is intimately connected, to be continued into the groin, in part covering the penis, passing and uniting with the fascia of the inside of the thigh: externally it is continued much stronger, but aponeurotic, over the muscles of the thigh, blending with the fascia of the fascia lata.

The fleshy panniele is very plentifully supplied throughout with nerves, which are distributed to it in very considerable branches, and which likewise many of them penetrate it to enter the skin. A very large bundle enters it from under the shoulder, and it receives one or more twigs from between each rib in its whole course. It is likewise as well supplied with blood vessels from the intercostals, and neighbouring parts. It must, therefore, be evident, that this muscular expansion, by its extensive attachments, can operate upon the skin in almost every part of the body; shaking and corrugating it in any and every direction.

The Hoofs.

The hoofs are considered frequently as appendages to the general integuments; and appear formed from the true skin, in the same manner as the cuticle: but we shall omit the consideration of them here, and describe them with the extremities.

ANATOMY OF THE HEAD.

Of the Head generally.

The parts forming the head are considered as external and internal. The external parts are the hair, the common integuments, the muscles, the glands, the periosteum, pericranium, and the bones themselves. The internal parts are the integuments of the brain, the brain itself, and its appendages, with its arteries and veins. We must consider likewise the ears and cavities of the ears, the eyes and their appendages, the nose and its cavities, and the opening of the mouth

with its contents. Some of these parts have been already considered in their proper places, such as have not we shall proceed to describe.

The Brain and its Meninges.

The *brain* is contained within the hollow of the skull formed by the bones of this part (*vide Osteology*), and is invested by certain membranes called its meninges or matres. The *dura mater* is the most external of these, and lines all the cavity of the skull, adhering to the bones by filaments, which are most numerous about the sutures, and perform the office of blood vessels. In its texture it is very strong and inelastic, and composed of two laminæ; its internal surface is smooth, but its outer is formed into filamentary processes by which it adheres to the cranium. By a folding and prolongation of its laminæ it also forms several other considerable processes. The *falx* is the principal of these, which, insinuating itself between the lobes of the brain like a mediastinum, is connected below to the frontal spine, to the spine of the ethmoid, to the sphenoid bone, anteriorly to the sagittal suture, and superiorly to the falciform process of the occipital bone; by this extension it forms posteriorly a loose portion received between the two lobes of the brain, which is thus called the falx, or the falciform process of the dura mater, from its supposed resemblance to a scythe; by means of which, the brain is kept firm, and the effects of concussion prevented: superiorly it is broader than inferiorly, and ends by expanding itself into the transverse septa. The *cavernous* or *sphenoidal sinuses* are of a very particular kind, containing their blood in a cavernous substance; and are composed of those processes of the dura mater that form the pituitary fossæ: they also pour their blood into the jugulars. Besides these principal ones, there are lesser folds containing blood, all communicating with each other; by which means the passage of this fluid through the brain has every advantage of situation. The dura mater is furnished with some nervous filaments from the fifth pair, and has some bodies within its substance that are supposed to be its glands. The *membrana arachnoidea* appears a very fine external lamen of the pia mater; so thin as to be compared to a spider's web, from whence it takes its name. It is spread uniformly over the surface of the brain, without entering into any of its convolutions, and is connected to the pia mater by a cellular substance. The *pia mater* appears that fine membrane that invests the brain and enters its convolutions, as well as those of the cerebellum and medulla oblongata. It is very vascular, and adheres to the dura mater by the veins passing from it into the sinuses; its principal use appears to be to carry the blood vessels to the brain.

Cerebrum.—The brain is divided into four different portions, which are the cerebrum, cerebellum, medulla oblongata, and spinal marrow. The *cerebrum* is an oval body filling up the cavity below the tentorium, and is situated under the cerebellum or little brain. It is anteriorly convex and oval, and posteriorly nearly flat: through its whole circumference it has depressions or windings, called its

convolutions, into which the pia mater insinuates. It is divided longitudinally into two lobes or lateral hemispheres, between which, the falciform process of the dura mater extends; but it has not, as in the human, other subdivisions into lesser lobules. It is made up of two substances, called its *cortical* and *medullary* portions. The first of these is exterior, and of a greyish colour; the other, forming the interior and larger portion, is firmer than the preceding, and of a whiter hue, and its tenacity even greater in the horse than the human. When the falx is removed, on separating the hemispheres, the *corpus callosum* appears, as a whitish medullary mass, internally striated, and represents a detached portion of the medulla. The corpus callosum terminates in a species of *medullary arch* formed in common with the medullary substance, in such a manner as to appear as it were a nucleus to the cerebrum, thus called *centrum ovale*. The *tentorium cerebelli*, forms the transverse septum dividing the cerebrum from the cerebellum, extending from the great internal ridge of the occipital bone. The situation of this part is very different in the horse from that of the human, and its extent is much less, as in ourselves it forms a kind of floor to the brain; it is united, as we have mentioned, with the falx, by which means both these expansions are kept tense. By this septum, the cranium is separated into two portions, a larger anterior and inferior, containing the two lobes of the cerebrum; and a smaller, which is superior and posterior in the usual position of the head. There are likewise two smaller portions that form a fossa for the reception of the pituitary gland. The *elongations of the dura mater*, are those parts of it which it sends out of the cavity of the skull to line the orbits, and unite with the periosteum; it gives also a vagina to the optic nerves, and lines the eustachian tubes; the vessels are likewise covered by it, as well as the spinal marrow; but which it leaves on its exit from the skull to be reflected on the bones. The *sinuses:* The dura mater is formed, as we have mentioned, of two laminæ, which, separating from each other, form triangular cavities filled with venous blood, and are called *sinuses*. The arteries of the dura mater are formed from ramifications of the vertebrals and carotids, which, after having traversed that membrane, are returned as well as the whole blood of the brain into these receptacles. The *longitudinal sinus* extends along the grand curvature of the dura mater, immediately under the sagittal suture to the transverse septa, where it bifurcates and forms the great lateral sinuses. It is narrow at the beginning, but becomes larger as it ends in the lateral, and has several ligamentary fræna, by which it is strengthened: the veins of the dura mater and brain open into it. The *lateral sinuses* appear continuations of the longitudinal, going one to the right and the other to the left, along and between the folds of the transverse septum its whole course, and pass out of the skull to end in the jugular veins. On making a longitudinal section of the two hemispheres on a level with the corpus callosum, two oblong cavities appear, which are the anterior or lateral ventricles, situated one

within each lobe, throughout its whole length, the inferior extremity being larger than the other, and both being divided by the *septum lucidum*. The ventricles contain, in a natural state, thirty or forty drops of fluid, but, under disease, frequently much more. The *fornix* is a medullary arch, and appears a portion of the corpus callosum, which divides the ventricle, and produces three bodies, called its *three pillars;* an inferior and two superior. Behind the fornix there is a hole by which the two great ventricles communicate with each other. The superior pillars being continued down within the ventricles in a curved form, as they pass, unite with two medullary bodies called *pedes hippocampi*, and between which are situated the little lines called the *lyre* or *psalterium*. On removing the fornix and laying the ventricles open, we see the *plexus choroides*, which is a vascular web, made up of vessels, and extremely subject to disease. When a horse has died of an inflammation of the brain, this body is generally found very much enlarged: a diseased appearance of it is particularly frequent in sheep also. It appears to answer the same purposes as the pia mater, that of distributing blood to the internal part of the brain by a circuitous course. There are besides in this view four other eminences; which are the two *corpora striata* and the *thalami nervorum opticorum*. The corpora striata are situated at the inferior part of the anterior ventricles, and are oblong curved eminences. The *thalami*, and *nervorum opticorum* are the beginning of the optic nerves, and are considerable eminences close together, situated between the superior extremity of the corpora striata, and appear composed of a cortical and medullary portion. The *third ventricle* is an opening or cavity close to the origin of the thalami, which communicates with the lateral ventricles, and the olfactory nerves or fourth ventricle. The *pituitary gland* is a spongy and apparently glandular body of very considerable comparative magnitude in the horse; lodged between the sphenoidal folds of the dura mater in the centre of the cavernous sinus, and surrounded by the numerous convolutions of the vessels and the sphenoidal sinuses. The *pineal gland* is a small eminence at the back of the corpora striata above the thalami, and is found sometimes to contain a gravelly substance in both the human and brute. The *tubercula quadrigemini*, or *nates* and *testes*, are four distinct small processes at the base of the skull; the first pair are situated above the pineal gland; the second are almost close to the first.

The *cerebellum* is contained within the occipital bone, and rests upon the tentorium or transverse septum of the dura mater; and is, in the horse, placed superiorly and a little posteriorly to the cerebrum, with which it unites by its inferior part. It is not so large as the cerebrum, and is divided into four lobes; which are an inferior, two lateral, and a superior. It is composed like the cerebrum of two substances, which are not disposed exactly in a similar manner, but give to a longitudinal section of this substance, the appearance of a tree, the medullary white part branching out from a body; whence

it is called *arbor vitæ*. Externally it is formed into numerous sulci, but it has no circumvolutions. The fourth ventricle, which in the horse is very considerable, is situated within this body, having its posterior surface upon the medulla oblongata, and its anterior being formed of the cerebellum.

The *medulla oblongata* is a continuation of the cerebrum and cerebellum, formed by the reciprocal continuity of their medullary substances, through the great notch in the transverse septum of the dura mater. On inverting the brain, the medulla presents four eminences, which are the *superior and inferior crura:* besides which there is another transverse and smaller, connected with them, termed *processus annularis,* or *pons varolii,* and two still lesser ones called the *mammillary processes.* The medulla oblongata, formed in this manner, is continued upwards and backwards to the edge of the foramen magnum of the os occipitis, when it terminates in the spinal marrow.

The *spinal marrow* is the continuation of the medulla oblongata, having passed the great occipital foramen, and being invested by a production or elongation of the dura mater. It is composed like the cerebrum and cerebellum, of which it appears a true continuation, of two portions, a cortical and medullary; but its consistence is firmer than the substances it proceeds from. It is continued down within the spinal canal, which is formed in the bodies of all the vertebræ, by which means it is wisely protected from injury. In its passage it gives between each vertebra a branch on either side, called the spinal nerve, which have been noticed. The *blood vessels* of the brain and medulla spinalis we have before described in the Angiology, where it will be found that this organ is supplied by the carotids and the vertebrals, which carry a large proportion of blood to the head. These arteries enter the skull in a very convoluted and winding manner; when anastomosing very freely, and giving some branches to the dura mater, they are continued on the pia mater, their capillary branches entering the substance of the brain. The medulla spinalis is furnished by two branches called arteriæ spinales, given from the vertebrals. The blood is returned by the veins of the pia mater, which accompany all the circumvolutions of the brain, and, at length, pour the blood into the sinuses. Upon an inspection of the vessels of an injected brain, we shall easily observe that nature has taken a wonderful degree of care to prevent the effects of too rapid a circulation of the great quantity of blood sent to it: and, from the great length of the carotids, an apoplectic tendency is counteracted. Nature, it is likewise worthy of remark, has kindly guarded the brain by a bony case, and as the vessels enter this case, they become also equally guarded; and that there might be no danger of the blood being stopped before it arrives here, there are two sets of arteries; one of which passes up in such a manner as to be freed from even the chance of pressure; being encased as it were by the cervical vertebræ, and hence called vertebrals. When arrived within the cavity of the cranium, these vessels have

frequent inosculations, which are such as to preserve a very free communication throughout; and not only the manner of distribution of the arteries of the brain is favourable to a tardy circulation, but even their structure is in some measure so. In the veins, likewise, there is a contrary speciality, because in them it was essentially necessary that they should be able to carry off the blood freely and regularly, seeing so great a quantity is sent to the head, and that the effects either of obstruction or rupture would be so serious: hence these veins have no valves, nor do they accompany the arteries; but are large, and formed of the strong firm coat of the dura mater, of a triangular figure, with sides still farther strengthened by transverse cords: these veins likewise have frequent inosculation, and like the arteries have two returning trunks to each side, one of which, the vertebral, is effectually guarded from pressure by its situation; and though the quantity usually returned by this vessel is small, yet, by their frequent communication, they can, when there is a necessity, receive a large proportion of blood.

Uses of the brain.—From the great derangement that takes place in the mind, when the brain is compressed or injured, we are led to conclude, that this part forms the seat of consciousness; but what real connexion exists between its functions, and that of the nerves, is much disputed. By some it has been said, that the brain is the organ of consciousness, but not the source of sensation, which resides in the nerves; but whatever may be the actual difference between sensation and consciousness, they probably are both dependent on the brain, or have the strongest connexion with it. That consciousness is dependent on the brain we are certain; since all intellectual power is lost when this is injured materially. This organ is not, however, essential to mere animal life; since we know some of the species who are without it, as the polypus; the fœtus in utero, likewise, in some instances lives and grows without it: but, in the human, and in all quadrupeds, who attain their growth, it is a necessary part of the machine; and is essential to the functions of those animals, who have to make intelligent exertions for the gratification of their various appetites. It is likewise found, that it exists in a greater proportion when the intellectual principle is strong; and hence it is larger in the higher order of animals than in the lower, and largest of all proportionally in man. (See *Neurology*.)

The Ear.

The number and situation of the *ears*, are well known to every one, and are formed of an inner and outer part. The internal parts do not very materially differ in different quadrupeds, nor from the human; but the form of the outer ear, is very wisely adapted to the various habits and manners of the animal on whom it is placed; and in almost all it differs much from the same part in man, who having a rational soul to direct him in his pursuits, and being endowed with foresight, can avoid those dangers which brutes must escape from, by means of the organs of sense, with which they are

endowed; hence we find in them, the ears are so formed as to take in a vast number of sonorous waves or rays of sound, and capable of being easily directed towards the quarter from whence the sound proceeds. In the predacious tribes they are directed forward; in the graminivorous, and timid, they are directed backwards: and in whatever way we regard the external ear, we shall find it admirably adapted to the habits of the animal of which it is a portion.

The *external parts of the ear* are the hair, skin, glands, muscles, cartilages, meatus auditorius externus, and membrana tympani*. The *hair* and *skin* of the ears do not materially differ from those of other parts; the hair is internally long and fine, and thereby guards the organ from the attack of insects; hence the clipping of this close may be prejudicial. The skin within the external ear is soft, and furnished with the general sebaceous glands, and with another kind called ceruminous, peculiar to it, which secrete a bitter whitish substance, intended probably to prove noxious to insects. The *muscles* of the ear in the horse are numerous and powerful, and are described in the Myology. The *cartilages* of the ear are three; the concha, or grand, the internal, and the anterior. The *concha*, or principal cartilage, is that conical body that gives figure and form to the ear; it is externally convex, and internally concave, covered by the skin and muscles externally, and internally by the skin, which is thrown into folds, forming longitudinal eminences and depressions, throughout the extent of the ear. The grand fossa appears like a cone, cut, not parallel to its base, but in a slanting direction from above downwards, leaving the ear elegantly pointed above, forming a circular cavity below, and an irregular oval opening outwards. This cartilage is fixed to the petrous process of the temporal bone, by means of two appendicles, and is maintained in this situation by ligamentous attachment. Within this, and attached likewise to the auditif canal, is the *internal cartilage*, which is nothing more than a small moveable portion, whereby the external cavity is rendered more tortuous: but the tortuosities of this cavity in the horse are not so numerous as in the ear of some animals; as in those of the dog, in whom they are extremely complex as well as numerous. The *anterior cartilage* is situated at the anterior part of the base of the grand cartilage: it is irregularly triangular, and has a ligamentary expansion inserted into the parietal bone, upon which it moves freely. The *meatus auditorius externus*, is in part bony, and in part cartilaginous; and very tortuous, whereby its surface is much increased, the cartilaginous forming the least portion: it enters the bony canal in the petrous part of the os temporis, whose extremity is furnished with a cartilaginous appendage. The *membrana tympani*, is the covering of a cavity, called the *drum* of the ear, formed of a fine membrane, fixed into a circular edge of

* The description of the ear would be simplified by considering the parts of which it is formed, as external, intermediate, and internal. The juvenile student finds it hard to reconcile to his ideas, or to consider the meatus auditorius and membrana tympani as external portions.

the meatus externus, and which separates the inner from the outer cavity. The tympanum is resembled to a drum, and this membrane to the drum head; and it is supposed that it has little muscles, giving it by their contractions different degrees of tensity, and thereby fitting it to receive the impressions of the air.

The *internal parts of the ear*, are the cavity of the tympanum, with its contents and appendages. This cavity is irregularly spherical, and presents several prominences and subordinate cavities. It contains likewise four small bones, which are named according to their supposed resemblance, incus, malleus, stapes, and orbicular. By these little bones, it is conjectured the impressions received by the membrana tympani are conducted, receiving modifications from the cochlea, and more interior parts. They are said to be all moved by three muscles, which belong, two of them to the malleus, and one to the stapes. (See *Myology*.)

The tympanum presents several openings, which are those of the mastoid cells, the eustachian tube, the cavity lodging one of the muscles of the malleus, and the communication between this cavity and the labyrinth, called the fenestra ovalis. The *mastoid cells* are small irregular cavities in the substance of the mastoid processes, which are lined by a fine membrane, and communicate with each other. Their common entrance is near the eustachian tube. The *eustachian tube*, is an opening at the upper and anterior edge of the hollow of the tympanum, forming a duct that is in part bony, and in part cartilaginous; extending from the tympanum to a great cavity at the posterior part of the nasal fossa. It is at its commencement an excavation of the petrous apophysis of the temporal bone, and extended by a portion of the sphenoid. From this to the termination in its membranous cavity, it is cartilaginous; but before it terminates, it becomes considerably enlarged to what it was when it arose, and terminates, as was said, in a membranous opening.

The *eustachian cavity*, is this large membranous vault, whose use is not known*; but it is probable, it has some connexion with the sense of hearing. It has no resemblance to the part of the same name in the human, which in him is nothing more than the cartilaginous enlargement of the eustachian tube: nor is it likewise so considerable in other animals, hence its use appears doubtful. It forms in the horse a very considerable cavity, one proper to each side of the head, the two being opposed to each other, but with some intermediate space between: in a natural state, it is situated with the posterior part towards the occipital bone, the superior towards part of

* It has been suggested, that this hollow is probably intended as an assistant to the action of neighing in horses, and braying in asses: but as each has a membrane by which it is shut out from immediate connexion with the larynx and pharynx, it does not appear easy to conceive, how it can influence these sounds, unless by the oscillations of the membrane itself. Bourgelat speaks of it, as a cavity open with the pharynx; but I have always found it, as I have said, separated by a fine membrane: perhaps, in the usual mode of examining it, this membrane has been torn through.

the pharynx; anteriorly towards the great nasal fossa, and inferiorly towards the inferior part of the pharynx: both are situated between the two long branches of the os hyoides, or rather each long branch of that bone extends up within their cavity. When therefore a section of the head is made, each appears as a membranous oval space, formed in the lateral part of the pharynx, and closed by a fine septum. Upon removing the membrane which separates it from the pharynx, the cavity appears; in each of which is seen the branch of the os hyoides, a lingual branch of nerves, the trunk of the carotid, and the continuation of the jugular, passing up its outer surface. The next opening of the tympanum is the *fenestra ovalis*, but which is only a hole of communication between the tympanum and the labyrinth. The fenestra rotunda is situated inferiorly to this, and is the opening to a particular duct in the labyrinth. The *vestibule* is the cavity in the petrous portion of the temporal bone, immediately beyond the tympanum; the fenestra ovalis being the common opening to them. The *semicircular canals* are described as three bony openings of nearly a semicircular form, within the substance of the bone; having five openings into the vestibule, in such a manner that there are two above, two below, and one in the middle. The *cochlea* is a double spiral canal, within the pars petrosa, having its opening in the vestibule. These spiral windings make two or three turns like the windings of a snail's shell, and which are divided from each other by a lamen of fine membrane. The whole internal cavity of the labyrinth is filled with a thin fluid, secreted probably from the vessels of the periosteum; by which, perhaps, the vibrations received by the membrane from the tympanum, are modulated and transmitted to the expansion of the nerves, in which the sense of hearing immediately resides: the modulation is, perhaps, farther carried on by the canals of the cochlea. The *nerves* of the inner and outer ear, are from the seventh pair, each of which soon separates into two portions; one passes by several small holes into the cavities we have described, as the vestibule, cochlea, and semicircular canals; and is spread on their surface in a soft pulpy form; from whence it has gained the name of *portio mollis*. The *portio dura* is the other part of this nerve, which passing out by the stylo-mastoid hole, gives a small branch, that passes through the tympanum, called *chorda tympani*, and then goes on to the base of the tongue.

The arteries of the internal ear arise from the external and internal carotids, and from the vertebrals. Its blood is returned by two veins, which pour it into the jugular. The outer ear receives its arteries from the external carotid, by a branch, called the auricular, arising immediately from either the temporal or maxillary branches of this artery; and which branch is ramified throughout all the outer ear, and returned by similar veins into the jugulars.

Sense of Hearing.

Hearing, as a sense, is involved in some degree of obscurity; nevertheless, philosophers have agreed pretty nearly in their mode of

explaining the phenomena arising from it. The expansion of the soft portion of the auditory nerve, renders it evident, that this inner portion of the ear must be very acute; and we observe the same wise provision for an increase of surface here as in the nose, by a tortuous direction of its cavities. The sonorous waves of the air, appear to be collected by any body whose surface is opposed to them; hence we may see how wisely the external ear of the animal is formed, being admirably adapted to receive a great number of these sonorous waves: and how much the mobility of this part must augment the effect, by being enabled to be exactly applied to meet the full direction of their course. Sounds, therefore, entering the cavity of the outer ear, are alternately reflected from the cartilaginous sides of the concha, till they arrive at the bottom; when, striking on the membrana tympani, they force it into similar oscillations, which are communicated to the inner cavities by means of the connexions we described, and there act upon the acutely sensible expansion of the auditory nerve.

The Eye.

The organ of vision, with its phenomena, have engaged the attention of the curious in every age. As a subject of curiosity, it is highly worthy of our attention; and as a subject of importance to the well being of the animal, it is even more so. It becomes more immediately a matter that ought to command a great portion of the research of the veterinarian, since it is an organ very liable to disease in the horse; and which diseases are of such a nature as have hitherto baffled all attempts to relieve them. We cannot contemplate the wonderful organization of the different senses, and the effects brought about by them, without being filled with admiration. It is a subject worthy of remark, that the same substance, the brain, should produce parts, or organs, sensible and open to such different impressions. The most attentive examination made between the optic and auditory nerves, shews little variation in structure; but yet how vast the difference between the senses of hearing and seeing! In the human and brute subject, the number of the eyes are the same; but their situation is in some measure different. They are placed in the human in the front of the face, while in the brute they are situated more to each side, that his field of view might be very extensive; since the arts of his enemies are such as counterbalance his own: but in man, who is intended by nature to meet with such enemies only, whose art is infinitely inferior to his own; so he is supposed not to need such a placing of his organs. In birds the lateral situation of the eye is such, that they can see objects in almost every direction; at least they can take cognizance of a large field; but again, it is such, that they cannot distinguish small objects with both eyes at the same time; hence the reason of the rapid motions of their heads.

The organ of vision may be divided into the *appendages of the eye*, and the *eye itself*. The *globe* is situated within a cavity, called

the *orbit*, which is formed by the concurrence of several bones (*see Osteology*), and which is penetrated at its bottom by its orbitary fissures, giving passage to nerves and blood vessels. It is lined by a periosteum formed from the dura mater coming also through the fissures. The globe of the eye may be considered as made up of parts investing, and parts invested. The parts investing are the muscles, the true tunics, or coats, and the simple expansions. The parts invested are the more internal expansions, the humours, and their capsules. As tunics, may be reckoned the conjunctiva, the sclerotica, and the cornea transparens. The internal expansions are the iris, the choroides, tapetum, and retina.

The *humours* are three. The aqueous, which is a thin fluid, contained in the anterior part of the eye. The vitreous, which is of the consistence of the white of an egg, and occupies the posterior portion. The third is the crystalline, of a more solid texture, and lenticular form, situated within the vitreous, and surrounded by its proper capsule.

The *coats of the eye*.—The *conjunctiva* is a fine delicate and transparent membrane lining the internal superfices of each eyelid, and reflected from thence over the anterior part of the globe of the eye: being thus reflected, a most admirable structure is brought about, affording every possible freedom of motion, yet the eye is amply secured within the orbit; but more particularly its use is displayed in preventing the entrance of any foreign substance. It is transparent, by which the white underneath shines through, and it presents different degrees of vascularity in different parts; that portion lining the eyelids is very vascular, and carries red blood in considerable quantities: this part also secretes a mucus that defends the surface of the eye from the irritation of the tears. That portion which is reflected on the opaque cornea is less vascular, but carries some red blood: but that reflected over the transparent cornea, is wholly deprived in a healthy state of any but the colourless parts of this fluid, that vision might not be obstructed *. The *sclerotica* is the outermost of the more complete investments of the eye; and is likewise the thickest and strongest, forming all the posterior and larger part of the globe; the remainder and smaller portion of the sphere being formed of the cornea, and which has been thought to be only a continuation of the sclerotica in a transparent form, thus giving rise to the terms transparent and opaque corneas. The sclerotic coat is of a firm fibrous but elastic texture, perforated at its posterior part by the optic nerve, but not directly in a line with the centre of the pupil; and is likewise perforated obliquely in other parts by nervous filaments and blood vessels. It is but little vascular, or sensible; and hence not much subjected to disease. The *cornea transparens* is that transparent portion which extends over the anterior part of the

* It is an inflammation of this coat that appears the principal seat of the ophthalmic affection to which the horse's eye is so liable; and which inflammation appears in him specific; commencing in the external coats of the eye, but terminating in the lens.

bulb of the eye; forming in itself the segment of a sphere, distinct from that portion of which the posterior part of the globe is formed: appearing thus like a segment of a small sphere, adapted to the segment of a larger one. The convexity is very different in different animals, by which the focal distance is adapted to the viewing of near or more distant objects, according to the habits and manners of the animal. In man the focal distance of the eye is less than a foot, and thus his cornea is considerably more convex. But the horse has to see objects from his eye to the ground, where the substances he most usually studies are placed; in him, therefore, the convexity is much less, and the focal distance of his eye is probably some feet: nevertheless it may be remarked, that where the eye, even in this animal, is too prominent, presenting a bold staring appearance, that such a horse is frequently subject to starting; and which leads us to suppose that they are some of them short-sighted. The cornea is sensible, and has a considerable degree of vascularity; though in a natural state it admits only the colourless parts of the blood: but under inflammation, when the diameter of the vessels becomes increased, the red particles are seen circulating through it; and which is alone a sufficient proof of its vascularity, and serves to account for its tendency to disease. The cornea was for a long time considered as cuticular, and as such all its diseases were treated mechanically; from whence sprung up the antient empirical and travelling oculists, who, in cases of opacity of this substance, introduced powdered glass within the eyelids; or made use of other means to rub or scour away the opaque part by mechanical friction: but we now know this to be organized and possessed of considerable living powers, whereby it exhibits the various phenomena of other parts. It inflames, it deposits coagulable lymph, and it takes it up again, or it suppurates and unites. I have seen in an ox a large fungous excrescence arising from the very centre of the transparent cornea, and communicating directly with no other part. This tunic is in different animals of different shapes, but in all admirably adapted to their various habits and manners: in the human, it is circular and small, but in the horse very little of the opaque part, or white of the eye, is exposed: but a very large surface of transparent matter, of a horizontal oblong shape, is exposed to the influence of the rays, by which means vision is very perfect in him. The cornea is formed of several laminæ which are separable by putrefaction or boiling.

The *internal expansions*.—The *iris* has been described by some anatomists as only a continuation of the choroides, but it is now more generally considered as a distinct muscular part, intended to regulate the focal distance of the eye, by directing the rays through particular portions of the crystalline lens. It is difficult to detect its structure, though in a dog's eye the muscular fibres appear to be demonstrable; and, under the influence of a high magnifier, it seems composed of two laminæ, between which are two plans of muscular fibres; one of which, the orbicular, surrounds the circumference of the pupil; the other is radiated, attached by one extremity to the

outer edge of the iris, and by the other to the orbicular plan. It will not, therefore, be difficult to conceive how the actions of the iris are brought about; by the orbicular it will be contracted, and the rays in a great measure shut out; and by the radiated it will be dilated, and more rays permitted to enter. The iris is situated within the cavity of the globe, immediately under the cornea; to which it corresponds in shape in all animals; being in the horse an horizontal oblong, by which means objects on each side can be distinguished, which are such as he most wishes to observe: for by this means he not only is enabled to see his food, but to avoid his enemies, which are not likely to attack him from above or below, but on a level with himself: by this means, likewise, he takes in the best field of object for his appetite, seeing those herbs on each side that he wishes to select. A similar formation exists in the ox and sheep; but in man, the direction of the iris is circular, for by his habits and manners, but more particularly by his intelligence, he is to take cognizance of objects in every direction. The iris has a power of contracting itself, either partially or generally, thus accommodating it thereby to any individual object. The colour of the eye depends on the iris; thus in the human it is commonly grey, black, or blue: in the horse it is usually brown, but now and then white, when the animal is said to be *wall-eyed*. The space between the inner circumference of the iris is usually termed the *pupil*, whose size increases or decreases as the iris contracts or dilates. The colour of the pupil is dependent, in a degree, on that of the bottom of the eye, and the transparency of its humours: but in a degree only; for the pupil of the horse is of a uniform greyish tint; though the substance at the bottom of the eye may be of very different shades. At the margin of the iris are seen some little globular bodies or bags covered with a black pigment, usually attached to the upper margin only, and when any exist on the lower they are small; these bodies appear designed to stifle a portion of the rays; and which, in a contracted state of the iris, when the pupil almost forms a circle, so fill up the remaining opening as to admit but little light. The iris therefore, it is evident, is a very important part, for by its actions, vision is in a great degree regulated. The *choroides* is an expansion of a very vascular structure, spread on the internal surface of the sclerotic, from the entrance of the optic nerve nearly as far as the cornea, where it turns inwards, forming plaits or folds, called the *ciliary processes*, and which are attached to, and spread on, the anterior and outer portions of the crystalline lens. Just before the choroides makes this inflection, its outer lamen is firmly fixed to the sclerotica by a sort of ligamentous circle, which is termed the *ciliary ligament*. The *membrana tapetum* and *nigrum pigmentum*, perhaps might, on a hasty view, be considered as one and the same; though the former is supposed peculiar to the brute eye, while the latter exists in both man and beast. The *pigment* is usually described and considered as a black mucus spread over the internal layer of the choroides, particularly at its anterior part, extending between the ciliary processes,

and adhering to the vitreous humour, forming a ring around it, which in the human is termed *zonula ciliaris*. It is this pigment that covers the three or four little bags, attached to the inferior edge of the superior portion of the iris. The *tapetum:* At the posterior part of the choroid coat there is a variegated expansion, which in the living subject has a membranous structure; but in the dead it becomes dissolved, and seems to so blend with the pigment, that it is not easy to say whether the tapetum is a distinct expansion peculiar to brutes, or whether it is only a similar substance with the pigment, but of a more solid contexture in the brute, as well as of a variegated colour. But there appears some reasons for considering the pigment and the tapetum distinct substances; the pigment is black, always of the consistence of mucus, and, moreover, lines both sides of the choroid coat. On the contrary, in a recent subject, the tapetum may be peeled off: it covers only the posterior part of the globe, and is of two shades, having a superior part light, and an inferior dark, which together produce the idea of a faded grey in the pupil.

It appears that the lighter is the colour of the tapetum, the better can the animal see at night; that is, a less quantity of perceptible rays are necessary to distinct vision in such animals than in others in whom this expansion is darker. In man, therefore, in whom the variegated expansion is wanting, and its place supplied by the dark pigment, the sense of seeing is very indistinct in the evening. But in those animals, whose habits lead them to prowl during the night, it is very light in colour, giving all the advantages we have described. In grazing animals it has a tendency to a greenish cast, whereby they are enabled to collect the rays corresponding to the colour of their food in great plenty, and yet in them it is sufficiently light to answer the purposes of nocturnal vision. In dogs likewise, who see remarkably well in the night, it is greyish; but in the cat tribe it is very light, and adapted to receive all the rays it meets with: hence they probably see better than any of the domestic animals. The *retina:* The last expansion, and most important, is the *retina*, or net-like; though it has no particular reticulated appearance upon observing it microscopically, nor does it present any decussation of fibres or interstices, except those made by the entrance of minute vessels; but appears composed of fibrillæ, whose diameter is supposed not equal to the 1200th part of an inch; which gives it the appearance of a very fine downy medullary and transparent lamen. It appears a true expansion of the optic nerve, which enters behind, pierces the sclerotic and choroid coats, and spreads over the internal surface of the globe, terminating within a very short distance of the ciliary circle, by this means reaching as far as it is possible for any rays to produce distinct vision; and it is only where this expansion exists, that the eye is susceptible to the impression of light. Objects, it is thought, are painted on the retina, in an opposite direction to their real situation; for the rays proceeding from the upper part of a body, as they pass through the upper part of the refracting boglies, are bent so as to reach the lower portion of the bottom of the

eye; and those from the bottom, the upper part: but though this appears inevitable; the mind, either from the decussation of the nervous fibres, or from the influence of habit, takes cognizance of them in an upright direction. It is evident likewise, that each eye receives and transmits a picture to the brain; but it is likewise probable, that these two transmitted portraits, by meeting at one point on the sensorium, give the idea of one object only.

The humours of the eye, and their capsules, come next to be noticed. The *vitreous humour* is of a jelly-like form and consistence, not unlike the white of an egg, and fills all the globe, except the spaces occupied by the aqueous humour and crystalline lens, corresponding in extent to the expansion of the retina; thus occupying the posterior part of the space, as the aqueous fills up the anterior, with the crystalline lodged between them in a fossula of the vitreous. It is surrounded by a capsule, termed *tunica vitrea*, which becomes evident on turning this humour carefully out of the eye, when it is found to retain a circumscribed situation within its capsule, but it gradually penetrates it, and runs off. The anterior part of the tunica vitrea is covered by black lines from the black mucus of the choroid, which terminate at the edge of the lens, as we mentioned, forming the zonula ciliaris. The *crystalline humour* forms a lenticular body of a tolerably firm consistence, therefore it can hardly with propriety be called a humour; but is more properly termed the *crystalline lens*. It is by the refraction of the rays of light through this substance, that vision is brought about; and hence different animals have it of different figures: in fishes it is nearly spherical, but in quadrupeds it is usually of a truly lenticular form. It is not of equal consistence throughout, but is much firmer in the middle, as well as its diameter greater; and, as the refraction of the rays of light are in proportion to the density of the medium through which they pass, so, by the contraction of the iris when the animal looks at near objects, he can force the rays to pass through the centre, whereby they become so much bent as to form a proper picture on the bottom of the eye. The sides of this lens are of a much thinner consistence, and hence refract less, and are therefore better adapted to the receiving distant objects. It is said to be composed of several laminæ, and under the microscope appears fibrous; it is also contained within a proper capsule, which is ultimately blended with the tunica vitrea, of which some suppose it only a duplicature; the posterior part is also much thinner than the anterior. Between the capsule and the lens there is a small drop of fluid to prevent friction, called *liquor Morgagni*, from the discoverer; and the whole of it, as well as its capsule, is organized. Ophthalmia, or the inflammation of the eye, usually ends by rendering this opaque, which then forms the disease termed cataract; the vessels of the capsule likewise sometimes ossify. The crystalline lens is situated within a fossula in the centre of the anterior part of the vitreous humour, just behind the iris, but is not connected to it: the space that is between it and the iris, which is very small, is called the *posterior chamber* of the eye; as that between the iris and cornea

forms the *anterior chamber*. The ciliary processes are seen, as we have described on its anterior part, and all the surface between their extent is penetrable to the rays of light, and forms the true pupil. The use of the lens appears to be to increase the refraction of the rays more than the other parts of the eye; and the existence of this lenticular body is urged as a proof that the adapting the eye to distances is not an act of the recti muscles.

The *aqueous humour* is a limpid fluid filling up the anterior and posterior chambers of the eye, and consequently it occupies the anterior parts of the globe; that portion of it behind the iris being very inconsiderable. It does not seem to have any proper capsule, and appears secreted by the arteries of the inner surface of the eye, and is capable of regeneration, in cases where it has escaped, in the operation of extracting for the cataract. The *muscles of the globe of the eye* are seven: four of these are termed *recti*, or *straight*, and perform the offices of elevation, depression, abduction, and adduction; from whence they receive individual names, as abductor, elevator, &c. They all arise from the bottom of the orbit, and are inserted into the anterior part of the sclerotica, either above, below, or to one side, according as they are to operate; by a tendinous expansion which extends as far as the edge of the cornea. Two others of the seven muscles are termed *obliquus major* and *minor*, or *trochlearis* and *antagonista*. The first of these arises from the inner and posterior portion of the orbit, and passes obliquely through a cartilaginous ring at the anterior and inner part of it; then returning, it passes under the levator rectus, to insert itself into the anterior and superior part of the globe: this, therefore, can draw the eye forward. The obliquus minor arises from near the nasal duct in the angular bone, and inserts itself towards the inner side, under the depressor rectus. Mr. Hunter conjectured, that these two muscles in conjunction could rotate the eye. The *retractor oculi*, or *choanoid*, forms the seventh muscle, and is peculiar to quadrupeds; being a very large and powerful bundle of fibres, that arises from the bottom of the orbit, envelopes the optic nerve, and inserts itself around the middle of the globe. This muscle acts on the globe of the eye, by very forcibly drawing it within the bottom of the orbit *, by which means it effectually protects it from injury: and as it is present equally in quadrupeds who do not graze, as those who do, as dogs, cats, &c., therefore *suspensory* appears a wrong term for it, but it is more properly called the *retractor*. The *membrana nictitans* appears an appendage to the retractor muscle, having its actions dependent on that. It consists of a firm cartilaginous substance, situated at the inner canthus,

* I was some years since requested to attempt the removal of a considerable excrescence that grew on the transparent cornea of a very valuable ox, in Sussex, where they are used in husbandry. On casting the animal, and forcibly keeping his eye open, the retractor muscle drew the globe so strongly within the orbit, as to elude all my attempts to reach it. It was uncertain and hazardous to attempt getting at it by the orbitary fossa, so that I was obliged to desist from my attempt.

hid by the eyelids, except a very small dark portion: but under inflammation of the eye, a large portion of it projects forward, which appears to arise from the action of the retractor muscle, drawing the globe inward to avoid the irritation of the light. The eye being imbedded in soft fatty substance, can be drawn backwards by a displacement of the fat, which being pressed forwards, it pushes on this membrane, that appears to have no appropriate muscle of its own, but acts always with the retractor. From this description, its uses become apparent; for it was kindly given as a third eyelid, to make up the deficiency resulting from the want of hands*. By its action, it as effectually, or even more effectually, wipes away dust, or other foreign bodies, than the fingers can possibly do. By farriers, this nictating cartilage is called the *haws;* and so unacquainted are they with its use, that when under inflammation of the eyes, the haws are drawn forward, as a protection against the light, they are mistaken by them for excrescences, or diseased enlargements, and as such are cut off; and which gross practice is recommended in some books of farriery, even of late date. When this barbarism is practised, sometimes the effusion of blood temporarily relieves, but more usually the irritation entirely deprives the animal of sight.

The *eyelids and their appendages.*—The palpebræ are a species of curtain placed before the eye with a section between, whereby they are divided into upper and lower lids. They are highly useful to animals, by defending the eye from the attack of insects when they sleep, and from blows, or extraneous matter at all times; they likewise ease and relax the whole structure of the eye, by shutting out the light, during the act of winking; whereby the optic nerve and iris losing their stimulus, cease their contractions, and enjoy a state of rest. The superior is the most considerable, the lower is less, and has but little motion: the places of their union are termed *angles*, one of which is internal and larger, the other external and smaller. They are made up of hair, skin, and cellular membrane; and have appendages, which are the muscles, the tarsi, the cilia, and the puncta lachrymalia. The *tarsi* are thin cartilages, which form the edges of each eyelid; those of the superior are larger than the inferior, and the edges that are applied to each other are termed *ciliary:* they have ligaments which are membranous elongations from the periosteum of the orbits attached to their edges; these form the eyelids themselves, but which are farther covered with the skin and muscles, as we shall explain. Along each ciliary edge are seen some little holes, called *puncta ciliaria*, pouring out a sebaceous matter. The *cilia*, or *eyelashes*, of the horse, are not similar to those of the human: the upper lid only is furnished with hairs immediately on the edge, and which are not placed in one,

* The monkey is an exception among quadrupeds; but which may readily be accounted for. Nature gives nothing in vain: and as this animal uses his fore-paws with great dexterity, so he is enabled, by this means, to defend his eyes sufficiently, and, for the same reason, it appears denied to man.

but in several small rows: the under has a few hairs only placed below the marginal edge. The horse has no supercilia, or eyebrows, unless we reckon as such the few straggling long hairs above the eyes. The *muscles of the palpebræ* are two; one surrounding the whole orbit, with its strongest part above, termed *orbicularis palpebrarum*, which shuts both eyelids; the other, proper to the upper lid, is termed *levator palpebræ superioris*, and arises from the bottom of its orbit, to be inserted into the upper lid, by which means it elevates it. These muscles have a compound and subordinate action, called *winking*. The *lachrymal gland* is a conglomerate body, lodged within the conjunctiva at the upper part of the orbit, in a fossa above the external angle; it appears to make several small lobes, and sends out five or six little ducts, which penetrate the conjunctiva, and pour out a saline fluid, called the *tears*, which lubricate the eye. This gland secretes, according to circumstances; as when the wind is strong, it is stimulated into increased action; under inflammation also it secretes very largely. The tears, though they assist the eye in its motions, would stimulate and irritate, if it were not for the mucus spread over the cornea, secreted from the conjunctiva and puncta ciliaria: thus in the human, a watery eye excoriates the cheeks, from the fluid flowing over the eyelids; and this gives that turgescence and redness to the eye from crying. The *puncta lachrymalia* are two openings that receive and carry off the tears that have been forced over the eye by winking: they are situated within the inner angle, and, in the human, conduct the tears into a sac, called the lachrymal; but in the horse there is no such, but the duct itself from each eye is conducted into the nose. The *caruncula lachrymalia* is a small body, whose substance is supposed to be glandular, situated between the internal angle of the palpebræ and the globe of the eye. It appears black in the horse, and red in man, and has a kind of fold of the conjunctiva, but is not entirely covered, as in the human, by this membrane: its principal use appears to be to direct the superfluous moisture secreted by the lachrymal duct to the puncta lachrymalia, from whence it is carried into the lachrymal duct, and so passes into the nose by the ductus ad nasum. (See *Osteology, and Description of the Nose.*) The vessels of the eye, are arteries from the external and internal carotids: the external parts being furnished by the maxillary; and the internal by the ocular and some branches that penetrate the sclerotic coat. The veins return their blood by the jugulars. The nerves are, besides the optic, some smaller ones, principally from the third, fourth, fifth, and sixth pairs. (See *Neurology.*) From the great vascularity and sensibility of the eye, it is very susceptible of disease; the two principal of which are cataract and gutta serena, which are in the horse even more obstinate and troublesome diseases than those of the human. The cataract is usually an effect of a specific inflammation peculiar to the horse, and by the farriers termed moon blindness. (See *Diseases of the Eyes.*)

Sense of Seeing, or Vision.

Light is a matter, or fluid, sui generis; passing from the sun to the earth with an astonishing quickness: and though these rays of light pass through the atmosphere, nearly in a right line in its ordinary state, yet when they pass through other media, they do not preserve this rectilinear course, but are bent towards a perpendicular in a degree equal to the density of the medium through which they pass. This bending of the rays is called their *refraction*; and upon which most of the phenomena of vision depend. The disposition to converge in the rays, as they pass through denser media, brings them finally to a point, and which is called their *focus*, or *focal point*: thus in a sphere of glass, as being a denser medium than one filled with water, the focal point will be only a fourth part of the diameter; but in a convex lens of glass forming part of a sphere, equal to 30 degrees, the focus will be a semi-diameter of the lens. It must, therefore, become evident, that the rays meet with several different refractions, or bendings, in passing through the eye; as they pass through media of such different densities. The passage through the cornea and aqueous humour must form their first refraction; and the more convex is the general form of the eye, the more must the rays be bent. But the crystalline has the greatest share, being of a lenticular form, the powers of which, as a refracting medium, must be great; add to which, that the rays in their passage through the vitreous humour must undergo a still farther bending, till they meet in a point on the retina. Thus it may be judged, the rays travel their course in such a manner, that having reached the retina they form a cone, the basis of which will be the surface of the cornea, and the apex the radiant point.

Amidst the wonderful number of objects that present themselves to the view of the animal, it appears that care is taken, that he shall have the means of collecting such only as are immediately, in some measure, connected with his views or pursuits; and even if he takes in the general field, the eye is so admirably formed, that no confusion exists: hence only such rays enter as are capable of this convergency, or if any others penetrate, they become lost in the nigrum pigmentum. Those rays, therefore, which the refracting power of the humours are able to concentrate, meet upon the retina in a point, or very small circle, within which the object is painted, and the mind takes cognizance of it through the medium of the optic nerves. As the eye must necessarily require to have a vast variety of objects painted upon it, whose distances are widely different; so there must be some optical adjustment of the powers of the part, to enable it to effect a distinct vision of all objects remote or near. But whether this is effected by the angle formed on the two opposite axes; or, as has been more lately taught, by a muscular power in the lens itself, is not yet satisfactorily proved: certain it is, that after the loss of one eye, time

is required for the remaining eye to learn to adjust distances; and this equally in the human and brute subjects*. Were it not for some adjustment of the optical organs, the rays reflected from objects very near the eye would fall behind it, and those from very distant objects would, from being almost parallel, meet together before the retina. The mechanical adjustment of the focus is also assisted in some measure by the iris, which contracts almost to a point when we look at a very minute object; and by this means only permits such rays to pass through as penetrate the centre of the lens, by which the rays will be very much refracted; but when the eye regards distant objects, the iris becomes dilated, and the rays are then received through the edges of the lens, by which their refraction is greatly lessened.

The Nose.

In brute animals, the organ of smelling is, next to that of seeing, the most essential; with us, it is less important than any of the other senses; but in them it forms the principal means by which they judge of good or evil: consequently we cannot be surprised that the nose of quadrupeds is very differently formed, and much more extensive than the human. The nasal organ makes up a very considerable portion of the head of the horse, and consists of two principal cavities, with lesser ones opening into them; each having an exterior communication, called the *nostril*, and an interior at the back of the mouth. These cavities are composed of common integuments, of muscles, of bone, of cartilages, and of membranes, with their proper vessels and nerves. The cavities of the nares or nostrils are limited anteriorly by the nasal bones, superiorly by the frontal, sphenoidal, and ethmoidal; laterally by the inferior and superior turbinated bones, and posteriorly by the palatine, and palatine portion of the maxillary bones. Immediately above the arch of the palate the nares reach upwards, and communicate with the frontal sinuses anteriorly, with the ethmoidal superiorly, and with the sphenoidal a little posteriorly and superiorly. They are divided in the middle by the septum narium, which is above bony, and below cartilaginous: the bony part is formed by the vomer which unites to the spine of the sphenoid, and to the middle lamen of the ethmoid: it extends downwards, being received by its anterior edge between the junction of the nasal, and by its posterior, in the groove formed by the union of the palatine bones, and of the

* Mr. Cline, in his lecture on the eye, used to mention a gentleman who was possessed of a valuable hunter; but which he found became from an excellent leaper, unable to measure his distances, and therefore, at times, made a violent spring at a low quickset; and, at others, fell far short, and threw himself and rider into a ditch. Upon the owner's mentioning this circumstance accidentally to Mr. Cline, he hinted that it might arise from the loss of one eye; and, on examination, it was found the animal had, unperceived, actually become blind on one side. Nor can horses, in general, who have lost an eye, be trusted safely to hunt, till they have learned to adjust the distances, which time enables them to do.

palatine part of the maxillary with each other. Having extended some way, it unites with the cartilaginous septum; which is continued down in the same manner as the vomer, that is, it is received anteriorly by the nasal bones, and posteriorly by the maxillary, till it arrives near the end of the nose, when it bifurcates into two portions.

The *frontal sinuses* are formed by the separation of the two tables of the frontal bones. (See *Osteology*.) There is usually a bony partition which forms them into two equal portions, and frequently other bony prolongations supporting the parieties. These sinuses communicate superiorly with the nasal cavities, and are lined by the same membrane lining those hollows: in ruminant animals they are infested with a species of fly. The *sphenoidal sinus* is formed from a vault in the middle of the substance of the bone of that name, and is likewise lined by the pituitary membrane, and communicates superiorly with the nasal cavities. The *ethmoidal cells* likewise communicate with the nasal fossæ superiorly, and are formed from the numerous cavities in the ethmoid bone, which are likewise lined by the pituitary membrane. The *maxillary cavities:* These can hardly be called sinuses; because though the maxillary bone forms an immense cavity, yet it is shut and nearly filled up by the *turbinated bones*, which have been described in the Osteology; it is only necessary to remark here, that both of them, by their tortuous direction within the nasal cavities, and their cellular and spongy texture, very considerably increase the surface of this mucous membrane, which seems their principal use. The *pituitary membrane* lines the whole nasal fossæ throughout all their compartments. It was first correctly described by Schneider, from whence it is frequently called schneiderian membrane: it appears continued to the pharynx and larynx; and this accounts, perhaps, for the disposition in long continued glanders to affect the lungs; the connexion of the membrane of the larynx, and that of the nose, continuing the specific inflammation to the membrane of the bronchia. It appears exquisitely fine and vascular in all its parts, and is furnished with a mucus throughout its whole extent, whereby the surface is always kept pliant, soft, and susceptible; by this mucus likewise insects are prevented from penetrating the nose. The evident use of the pituitary membrane appears to be a medium for the expansion of the olfactory nerves; whereby the impressions from the effluvia of different substances are received. *Ductus ad nasum:* The puncta lachrymalia, which we described in the eye, are the openings to a canal within the angular bone (see *Osteology*), called the *nasal duct*, which is continued membranous between the turbinated bones, and terminates by an opening within the nostril near the bottom, where it may be easily seen. This duct carries off the superfluous saline fluid, secreted by the lachrymal gland. Being lined with the pituitary membrane, in glanders it becomes obstructed, whereby the tears flow over the face; and at length the matter itself flows out at the puncta lachrymalia: in inflam-

mations of the eye, the puncta likewise become so inflamed as to be impervious for a time; hence a horse in this affection is always weeping.

The common integuments of the other parts are spread over the nose, except that there appears but little adipose membrane; it is likewise furnished with hair to the edges of the nostrils, and is internally lined throughout with the pituitary membrane, except the inner edge, which is furnished by the skin; but blended, as it were, with the mucous covering. By a fold of the common integuments, the *false nostrils* are formed, appearing as a cavity on each side, running some way up the nose, and then terminating; forming below, the appearance sufficiently known to every one acquainted with horses: within which fold is situated a cartilage, by whose means the surface is kept dilated. The nose is influenced in its motions by means of three pair of muscles and a single one. (See *Myology*.) Its vessels are numerous, as its membrane is very vascular and extensive: it gains a large branch from the maxillary, the ocular, and the palatine arteries. Its venal blood is returned by the maxillary and palatine veins into the jugular. (See *Angiology*.) The nerves are furnished from the first and fourth pairs: the olfactory we have described as very large hollow branches, which are expanded into a pulpy mass over the whole pituitary surface, rendering it highly sensible to impressions received from the effluvia of bodies. The external parts are furnished by a branch of the fifth pair. (See *Nerves*.)

Sense of Smelling.

Smelling is that faculty by which animals take cognizance of bodies by means of the volatile parts flying off from them, and which diffused every where around, some of them strike the olfactory organs, and, by means of the nervous fibrillæ expanded over the pituitary membrane, communicate a sensation to the brain that produces the idea of smell.

Cavity of the Mouth, with its Parts.

This cavity in the horse, forms all that extensive opening, from the first cervical vertebra to the incisive teeth; bounded above by the palatine arch, and below by the tongue: and is divided into the mouth, properly so called, and the large posterior cavity uniting and partly forming the pharynx. The mouth is composed of external and internal parts: the external are the lips, cheeks, and beard: the internal are the gums, the bars, the teeth, the alveolary edges, the palate, the septum palati, and the tongue. The *lips* form the inferior and external parts of the mouth, and are two in number; an upper and lower, or anterior and posterior: and both are composed of fleshy masses fixed in different directions around them, but principally a circular one, forming the orbicular muscle, or sphincter oris: the rest are composed of the numerous muscular plans that perform the various motions of the mouth and lips. (See

Myology.) They have, besides these muscular strata, a species of peculiar cellular substance interposed. The outer covering of the lips is not exactly like that of the other parts, being nearly devoid of hair, much thinner and finer; and, by this means, possessing a greater sensibility, which is of great use to an animal that makes use of the lips as the organs of touch: as this membrane turns to line the inner side of the lip, it becomes of still more vascular and villous a texture, and combines with the glandulous or mucous membrane of the mouth. The muscles of the lips are so numerous, and their motions so various, that the animal is thereby enabled to collect his food, and to form and place it between his teeth by their assistance: by these means likewise the young animal sucks its milk; and, in fact, so various are the dispositions of the muscular plans around the mouth, that, like the tongue, there is no direction in which they cannot place themselves. In some brutes they supply the place of fingers in most cases, and seem to be the organ of feeling principally resorted to. The blood vessels of the lips are furnished from the labial artery and veins. (See *Angiology.*) The nerves arise from the fifth pair, which come out at the foraminæ of the two maxilla. The *gums* are that substance that appears on the alveolary edges of each jaw on either side, insinuating between the teeth, and surrounding each of their necks, so that the inner and outer gums unite; by which means they support the teeth in their situation. The substance of the gums is very elastic and compact, adhering to the bones by means of the periosteum, and externally covered by the same strong polished membrane that covers the internal parts of the lips, and which appears formed from a union of the proper membrane of the mouth and of the cuticle: thus it participates in the colour of the general skin, being sometimes light, and at others dark: this membrane, continued from the posterior part of the alveolary edges, blends with the membrane of the mouth, and at the lower part of the channel forms a kind of fold, which the French call *barbillions*, and the English *barbs* *,

* It is surprising, that so excellent an anatomist as Bourgelat should regard this duplication of the skin as a defect, 'Les excroissances contre nature que l'on 'nomme barbes ou barbillions.' It may be remarked, nature, in the usual course of her proceedings, forms nothing useless or originally defective. With regard to these, they are of evident and great utility in confining the motions of the tongue, and assisting the ligamentary connexion. In old books of farriery, we always meet with the terms paps and barbs under the diseases of the mouth. These, by time, became confounded, so that one term was used for the other. But it should appear that *barbs* originally expressed this duplicature of the membranes of these parts, and which, in inflammation of the mouth, becoming enlarged, were regarded as the cause of the disease, and hence extirpated. The *paps* were originally intended to express the little mammillary terminations of the salivary ducts, which are situated near the barbs. These the ignorance of the times regarded as excrescences also, and directed them to be cut close away. In the first instance, the excising of the barbs, or of that duplicature of the skin I have described, might not be attended with any danger; but the removal of the paps would very probably obstruct the salivary duct; this must produce inflammation in the gland, which, if it proceeded to suppuration, would form a very troublesome wound, and finally

which folds appear to connect the tongue, and to confine its motions. The substance of the gums, though very plentifully supplied with blood vessels from the maxillary branches, is but sparingly supplied with nerves from the fifth pair; by which means they are very vascular, but not very sensible, except under inflammation. Were they as sensible as some other parts, the hard substances taken into the mouth, as corn, hay, &c., would hurt them by its pressure; particularly where they are much exposed, as over the bars, &c.

The *bars* are, anatomically considered, only spaces left by nature between the teeth, from the great length of the jaws; for incisive teeth continued up so high would have been useless, and never brought into action, whereby their wear would not have been equal to the others; and thus they would in the end have starved the owner: nor was it necessary that the molar teeth should reach thus far; for being so distant from the centre of motion, the animal would have found their strength very disproportionate to those higher up. But nature delights not in cavities or vacuums, but follows throughout her works a similitude, and blends her characters into each other; therefore she has given a canine tooth in this place, and which appears designed to break the vacancy, as well as to keep up this connexion between the carnivorous and granivorous tribes. Man, ever alert to take advantage of what nature puts into his reach, turns this space to the utmost use; and that which to the anatomist forms a part but little worthy of attention, is, with the riding-master, a subject of the greatest importance. The bars form those parts upon which the bit of the bridle rests, whereby we insure the obedience of the animal; they are continuations of the alveolary edges, more or less rounded in different subjects, and furnished with the gums, which are likewise more or less thick in some than others. Though, as we have said, the gums are not very sensible, yet they are sufficiently so to feel very forcibly the strong pressure of the bit of the bridle upon this part; and, independent of which, the skin of the branches of the jaw above the chin is very sensible, which being pressed by the curb against the sharp edges of the jaw bone, farther insures the obedience of the animal:

injure and blemish the animal. From an ignorance of the anatomy of the horse, these errors not only arose but were disseminated. Bracken, falling into the same, speaks of these excrescences under the tongue, and recommends their removal. Bartlet, who was still less acquainted with the structure of this animal, copied him; and from these sources these gross errors have continued to be handed down in all the treatises on this subject to the present day. Persons who profess to instruct in any art, should be doubly careful how they receive the errors of others, and propagate them blindly. Not only is much mischief done to the veterinary practice by promulgating these erroneous principles, but neighbouring nations (who have no other means of judging of our improvements but by our public works) form a very disadvantageous opinion of the state of the art among us. In a late voluminous but wretched publication, we see '*barbs* or *paps* are small excrescences under the tongue; when preternaturally enlarged, cut them close.'—*J. Lawrence*, vol. ii, p. 490.

but horsemen pay less regard to this part (though it is the most sensible) than to the bars, because the pressure on the chin by the curb, produces but one action, that of stopping progression; whereas, by means of the sensibility of the bars, various actions are brought about, and the horse directed to either side; as, therefore, this is more or less sensible, so is the horse said to have a better or a worse mouth. When the alveolary edges of the posterior jaw are very sharp, the pressure of the gums upon them, by means of the bit, must be painful, and this must be much increased in those gums naturally very sensible; and, in this case, a horse may have too tender a mouth. On the contrary, when the bony part of the bars is round and smooth, the gums must suffer less from pressure; and this in a still greater degree, if there is superadded a natural insensibility of the gums, which then constitutes a hard mouth. It is supposed, that putting a horse on a champing bit increases the sensibility of the mouth, for, by masticating upon the bit, the bars are rendered more sensible; but if this custom is too long continued, in the end, the continued friction and pressure will harden the gums from the cuticular increase; it will likewise wear the teeth. To keep the bars sensible, there should never be, during action, but a momentary pressure upon them; and a kind of play between the mouth and the hand of the rider, and an oscillatory motion of the bridle; by which slight pressure the obedience of the horse will be obtained; his mind will be occupied upon its proper subject; that is, his attention will be engaged on a progression subjected to the will of his rider, and his mouth, as it is termed, will be kept alive, and always sensible. Hence, it is evident, that the custom of riding hacknies so much with snaffles, in which there is no aid derived from the chin, but the whole stress laid upon the bars, is founded on wrong principles. Whenever these bridles are used, they should be large; nor should a servant be allowed to water or exercise a horse with a less snaffle than one, whose diameter is three quarters of an inch in the part that presses upon the bars.

I have entered into this subject more widely than perhaps may be deemed necessary, and it may be thought foreign to my text; but it is so important, and so practically connected with the description of the part concerned, that I have ventured on this digression.

The *teeth* are parts within the mouth, contained within the alveolary edges of the superior, inferior, and posterior maxillary bones, and which have been particularly described in the Osteology. The *palate* is divided into its arch and its septum. The *arch* is bony and membranous; the membranous structure adheres by its inner surface to the bony palatine arch, formed of the palatine portions of the superior maxillary bones: its outer surface is thrown into very considerable rugæ, or folds, which are more distant from each other, and larger in the inferior part of the arch towards the incisive teeth, than in the superior and farther part of the mouth. The palatine arch appears formed of the common integuments with a

dense cellular substance, and is laterally connected with the membrane of the gums. In colts and young horses, this part is naturally thicker than in old ones: sometimes it is so much so as to reverse the palatine arch, making it convex instead of concave; in these cases it is usual, with the generality of farriers, to say such a horse has the lampas; and the part is either cauterized or scarified, putting the horse to much pain, and frequently producing a caries of the bone. The membrane itself, however, may now and then become to a great degree preternaturally enlarged; but it seldom can require such strong means as burning iron; it will generally give way to astringent applications. (See *Lampas*.) The use of these rugæ is to prevent the falling out of the food from the mouth in the inclined situation of the head: in the human, as the head is held in a different position, they are but little evident, as being but little necessary.

The *velum palati* forms the posterior portion of this arch, and is attached to the palatine edges, and to the maxillary bones; laterally, it appears formed from a continuation of the membranes of the palate and muscular fasciculi. This septum presents an inferior or posterior opening, by which means it divides the mouth from the pharynx, having its superior or anterior portions fixed to the palatine bone, where the arch of the palate ceases; its sides having a lateral attachment, and its centre floating loose within the cavity, like a curtain of division between these parts, but presenting a central opening similar to the arch of a bridge. In the middle of this arch, there is, in the human, a glandular pendulous body termed the uvula, but in the horse there is no such part; but, instead of it, the velum palati is much more extensive, and extends lower down, in such manner that only this slight opening we have mentioned appears; and which also is exactly closed up by a cartilage proper to the larynx: so that except when the horse is swallowing, there is no immediate communication between the mouth and the pharynx. The cavities of the nose open into the pharynx; and the larynx opens likewise into the same hollow: as, therefore, the communication between the mouth and pharynx is shut out, it is evident, that the horse cannot breathe by his mouth; and when any air comes by this way, as in coughing, it is only by a convulsive displacement of the velum palati. The œsophagus likewise opens into the pharynx, consequently there is no passage for the food either were it to return: thus, if a horse's stomach was so formed that he could vomit, he would be suffocated; for the matter would be forced into the nose, unless the same convulsive effort before noticed should force it into the mouth. But in those animals who can vomit, the velum palati is not so extensive, and they likewise can breathe through the mouth.

Though the curtain of the palate cannot be carried forward, but by a very convulsive effort, it is so situated as very easily to be carried back; at least, it can be very considerably elevated by means of its muscles, which are very numerous, and their size and direc-

tion such, that they have never been all named (see *Myology*). By means of these muscular fibres, the velum palati becomes elevated, and the masticated bolus passing over the epiglottis presses it down, whereby the opening becomes at once increased, and the cavity of the larynx shut, so that nothing is permitted by this formation to pass from the pharynx to the mouth; but every thing easily from the mouth to the pharynx. There are on each side fleshy pillars, or half arches, formed of muscular fibres, within a duplicature of the common membrane, terminating by one part in the velum palati and pharynx, and by the other in the base of the tongue; by means of which the motions of the velum palati are assisted. It appears probable, that these are particularly useful in bringing about that concordance of action between these parts; for at the same time that the palatine septum is carried back, the larynx is raised, and, with it, the œsophagus; the pharynx is at the same time depressed, the tongue usually contracted, and its base elevated.

The *tongue* is that large fleshy mass that fills up the channel, or space between the branches of the posterior jaw, surrounded by the alveolary border, and extending upwards, so as to adapt itself to the arch of the palate. (See *Plate* III.) It is a most moveable part, perhaps the most so of any, being almost wholly composed of muscular fibres. It is divided into basis or root, apex or point, anterior and posterior sides, and its edges. The base is the upper part, and is much the thickest, but it has no line of division on its surface, as in the human. The surface of the tongue appears composed of coverings nearly similar to the common integuments of the body, with the addition of an arrangement of numerous papillæ, and a thick reticular structure of rete mucosum: this papillary texture pierces the rete mucosum, with a portion of the cuticle over it; the posterior surface appears nearly cuticular, and presents none of these eminences. On examination these papillæ appear of different forms, and are in some animals very large, as in the ox, bear, and some others. The muscular fibres composing the tongue are placed in every direction, with a whitish substance interposed in a transverse direction between; which substance is much more considerable near the base. The fibres in the central parts of the organ are placed in various ways, that the motion may be performed on all sides: besides which, there appears a perpendicular plane immediately under the surface, whereby its mass is shortened. The tongue is connected by means of muscles to the os hyoides, and by a duplicature of the membrane of the mouth on each side. Its proper muscles are those between it and the os hyoides, and those between the os hyoides and other parts (see *Myology*). The blood vessels of this organ are the raninæ and palatine (see *Angiology*). The nerves are the ninth, or gustatory; and a branch of the fifth pair (see *Neurology*). *For an exemplification of these parts, see Plate* III.

The tongue is a very principal organ in mastication: by its great

mobility it carries the food into every direction the most favourable for it to be chewed in; and, finally, passes it to the pharynx.

Sense of Tasting.

The tongue is the principal organ of this sense, though taste is not entirely confined to it, as the palate and fauces participate. Only the anterior surface and lateral edge of the human tongue are fitted to exercise this function, and from analogy we are led to suppose it the same with brutes. Taste is, perhaps, a higher degree of touch, or a modification of it, since we can feel, with astonishing precision, any object by the tongue: its being always moist, also greatly increases its exquisite sensibility. Taste was given to brutes to regulate their other senses, and thus there are few plants or substances whose application to the tongue produces an agreeable effect, but such as are proper for food. Nature, therefore, stimulates her creatures to take food by a double motive; the pleasure of taste, and the pain of hunger: and for this reason it is, that we find animals will not thrive on some food that is capable of forming nutriment, for they are not stimulated by taste; and a less quantity will damp the calls of hunger than is necessary to fatten. It must, however, be confessed, that the discriminating quality in brutes, with regard to food, is greatly assisted by their sense of smelling.

The Pharynx.

I shall consider and describe as *pharynx*, all that considerable cavity, superior and posterior to the mouth, properly so called; and divided from it by the velum palati. It is usual to consider the cavity generally as the posterior part of the mouth, or hinder mouth; and then to consider the pharynx as a portion of this, whose line of division is imaginary: but as it is evidently one hollow, having the openings of several other cavities and canals within it, I shall consider the whole as pharynx, and which will much expedite and facilitate a just knowledge of it, which is the only true intent of anatomy. Within the pharynx, so considered, are seen, the communication with the mouth, the opening of the nasal fossæ by means of the fauces (which are only the upper and anterior portions of this cavity), the membrane covering the eustachian vault, the cavity of the larynx, and that of the œsophagus. The manner in which the nasal fossæ open into it, is best learned by a reference to Plate III, where the true situation is at once seen. The *eustachian cavity* is shut from immediate communication with the pharynx, by means of its membranous covering: this cavity is placed on each side of the pharynx, immediately behind the base of the skull. (*Vide Plate* III.)

The *larynx* is the opening, or commencement of the trachea, and is placed in the posterior part of the pharynx, and forms a kind of cartilaginous box, composed principally of five pieces, which are so situated between the branches of the os hyoides, and so connected

with this bone, as to have very small lateral motion; but an extensive one above, downwards, forwards, and backwards, as the situation of the parts may vary. These cartilages are, the thyroid, the cricoid, the two arytenoid, and the epiglottis. (*Vide Plate* III.) The *thyroid cartilage* is the most considerable, and forms a kind of half circle, having a longitudinal convexity on the anterior part, and being concave within; it is united to the lateral and middle parts of the cricoid cartilage; superiorly it is received between the branches of the os hyoides, to which it is attached by a ligament within it: the epiglottis is situated as it were at its anterior part. The *cricoid* cartilage approaches in figure to a thick ring, and is received, in some measure, within the thyroid, and united to it by a ligament: it articulates above with the arytenoid, and below with the thyroid, as we have described, and its base unites with the beginning of the trachea. The *arytenoid* are two small similar cartilages, situated posteriorly above the cricoid, and rather within the cavity of the larynx, uniting together at the beginning of the glottis: their concave inferior surface receives the superior convex surface of the cricoid cartilage, and the superior extremity forms a kind of point curved backwards. The *epiglottis* (*vide Plate* III), is a very elastic tongue-like body, situated and attached to the anterior portion of the thyroid by a strong ligament. Its internal surface is concave; its external is slightly convex, and attached to the base of the tongue by some muscular fibres; it ends in a point, which is curved forward. This cartilage is of the utmost importance to the animal; it exactly fills up the floating arch of the velum palati, thereby shutting the cavity of the mouth, and making the animal breathe through his nose. As the bolus passes forwards, this cartilage is forced down, and then exactly fits the opening of the glottis, and by this means the entrance of any thing within the trachea is prevented. As soon as the bolus has passed, the epiglottis by its elasticity, and, perhaps, assisted by muscular fibres, returns to its situation. And here we must, in a particular manner, admire the wisdom of its formation: had it been ligamentary, and influenced in its actions only by muscles, it would continually endanger the animal; for numerous diseases might affect the muscular energy: but the cartilaginous elasticity is never lost till the body falls into a state of decomposition and decay. The *glottis* is nothing more than the oval opening into the box, formed by means of the cartilages, and their numerous connecting membranes and ligaments.

The larynx gives insertion to a great number of muscles, and its motions are consequently very much varied; some of these operate on the whole of it as a body, and have their attachments in other parts; some operate only on particular cartilages, but are wholly inserted in the larynx: the sterno thyroidæi draws the opening downwards after it has been raised in deglutition; it is elevated in this action by the hyo thyroidæi. The crico thyroidæi, crico arytenoidæi lateralis and posterioris, thyro arytenoidæi, hyo epiglottici, are all muscles that act upon the different cartilages; by which means the

cavity of the larynx is altered in its figure and dimensions, and the sounds of the voice thus variously modulated. The membrane lining this part appears a continuation of that of the pharynx, and is very vascular and sensible, being continually kept moist by its mucous secretion. The *thyroid glands* are situated one on each side of the cricoid cartilage (in the human, the thyroid gland is one body, situated at the anterior convex side of the larynx); here it forms two oval glandular bodies, but whose use in either subject is unknown. The vessels of the larynx are the laryngeal, arising from the carotids and jugulars, and its nerves the recurrents, which originate from the eighth pair. (See *Neurology*.)

Uses of the larynx.—This part answers two very principal purposes in the economy: it is the organ by which air is received into the lungs; it is likewise the organ of the voice, and by which sound is produced; hence, if the recurrent nerves, going to this part, are divided, the voice is entirely lost. The cartilages of the larynx are moveable one upon the other; and this motion is effected by means of the various movements which influence the voice, whose intonations are formed by an expiration producing a vibration in the cavity, which, acting upon the air, is transmitted to the ear; and hence we become sensible to what is called the voice. The cartilages, being acted upon by the muscles, produce different degrees of tensity, and different degrees of constriction in the larynx, which occasions the voice to be variously disposed. In the ass, the principal sounds are those of *braying*, and perhaps he differs in no respect so much from the horse as in the sounds he produces; and this is another very strong proof, that an ass is not a horse degenerated, as has been by some supposed. *Braying* appears produced through the mouth, by a convulsive forcing of the velum palati, as in coughing, and is effected by alternate inspirations and expirations; the inspirations forming half tones, and the lengthened notes being formed of expirations. The action of *neighing*, on the contrary, is produced wholly of expirations, as, indeed, are most of the tones of the horse's voice; and it is likewise produced wholly through the nose, as is proved by slitting the nasal cartilage, which prevents it: this, therefore, makes a very essential distinction between these two animals. *Knuckering*, as it is termed, is only a lesser neigh, with shorter, deeper, and less forcible tones, and expresses affection and joy. The horse has one acute sound, produced by the act of inspiration, which usually expresses either play or lust: but in most other instances, sound in the horse is produced from expirations: nor does it appear that the tongue or teeth are much concerned in the modulations of his voice; but in dogs they are very much concerned. The *lowing* of oxen is likewise performed through the mouth; and the *bleating* of sheep also: hence it would appear, that the mouth is better adapted to convey sound than the nose; or at least it produces more variety in tones, though the passage is not so direct. *Barking* is formed of short-continued expirations, with the jaws very slightly separated, succeeded by a quick and forcible expiration, the mouth being alter-

nately opened and shut. A dog produces more tones than most quadrupeds; his *howl* consists of a great variety of notes, but are all formed with the mouth open. *Snarling* is effected by a tremor of the velum palati, and can be brought about equally by expiration or inspiration. The *mewing* of a cat is produced by expiration, both through the nose and mouth; beginning with the consonant *m*, and continued by passing the air through the nose, and then following it with a more steady expiration through the open mouth, the shutting of which produces the final expression. The *grunting* of hogs appears generally composed of expirations, and can be effected either through the mouth or nose, and consists in a convulsive tremor of the curtain of the palate during the expiration: their cry of distress is effected through the mouth by expirations: thus persons, when killing pigs, usually tie the mouth, to drown or lessen the noise.

Deglutition, or the uses of the mouth and pharynx.—Animals have organs wisely adapted to their wants. The reception of food into the stomach is a process of great importance, and managed with considerable art. The food of the horse is grain or herbage, in a state of nature, usually collected near the ground. When a horse grazes, he crops the grass with his incisive teeth, first placing by his lips a tuft between them, when, elevating his chin, the sharp edges of the under ones become applied to the grass, and cut it through; were it not cut, instead of torn, the horse would be under the necessity of taking up roots and all: therefore, it will be found, the prominent edges of these teeth are all wisely adapted to this process. In the ox and sheep, who have no upper nippers, they wrap a tuft of grass round with their tongue, and then apply it to the under incisive, by which it is cut off; therefore, they are obliged always to carry the chin forward in collecting their grass. When a quantity of grass, or herbage, is thus gained, it is carried by the tongue and molar muscles to the upper part of the mouth, to encounter the action of the grinders, and to be mixed with saliva during the process; for which the broad flat surfaces of their teeth are admirably adapted. The matter is carried from side to side, so as to be placed in the most favourable direction, for perfect mastication, by means of the tongue and molar muscles. During this process, it continues to be mixed with the salivary fluid, from the parotid, maxillary, and sublingual glands, which pour out their secretion by the pressure of the surrounding muscles, in greater quantity than usual: and for which reason, that is, to be subjected to this pressure, these glands are so placed as to be near the motion of the muscles used in mastication: but this is not the only stimulus to them; they are acted upon by the mind likewise; for we find if victuals is placed before a hungry dog, just without his reach, his jaws will pour out saliva in great plenty.

The mass having thus been completely masticated, is, by the tongue, carried backwards, and upwards into the pharynx, and, during its passage, the epiglottis becomes pressed down, so as exactly to cover the glottis, or opening of the larynx, and the velum palati is at the same time carried backwards so as to close the nasal fossæ.

The mouth is kept shut during this action, that the muscles may find a fixed point; the pharynx then first sinks to receive the bolus pushed into it by the contraction of the tongue, whereby its base becomes elevated and enlarged, and completely stops up the opening towards the mouth, it also keeps the larynx closed; the pharynx then receiving it, first sinks, as we have said, to permit its entry, and then rises, with the funnel-like extremity of the œsophagus open, into which the bolus is forced, and, by its muscular powers, moulded into a proper shape. The action after this becomes involuntary, the mass being pushed forward through the œsophagus by means of its muscular structure, as will be explained hereafter. The gullet has this power independent of the gravity of the substance; for grazing animals always swallow against the gravity of the aliment. But until it has entered the common canal of the œsophagus, without the assistance of the tongue, deglutition cannot be performed. A woman, who had lost this organ, was forced always to place the food, by means of a spoon, or fork, quite into the pharynx, or she could not swallow: so animals, who have been deprived of the tongue, elevate the head to let the substance gravitate: hence becomes evident the folly of those farriers, who attempt to give a ball, yet the whole time confine the tongue till they suppose it is swallowed; for, by preventing this body from being raised at its base, the ball cannot be carried back, but either remains or gets into some of the interstices of the mouth.

The *glands* of the head are folliculose, mucous, and salivary, with the sebaceous ones of the ears. The folliculose and mucous have been already described; we need only add, that the whole of the membrane of the nose, mouth, pharynx, and larynx, are secreting surfaces, and constantly form a mucus, which defends these parts from the external atmosphere, and keeps up the sensibility of their surfaces. When this membrane becomes inflamed, it forms catarrh, in which case, the secretion is at first increased and thinner, but at last degenerates into a thicker and more purulent state. The salivary glands secrete the fluid we call the saliva, whose use appears to be that of diluting the food, and fitting it for its maceration. The principal of these are the parotid, the maxillary, and the sublingual, which have already been described fully. (See *Adenology*.)

Description of Plate III.

This Plate represents a section of the head, as far as the second cervical vertebra, carefully made. The section was not carried exactly through the centre, but inclined more to the right side, consequently leaving the left portion rather the largest, by which means the septa dividing the parts are preserved.

Figure the First

Presents the left portion of the section, in which the cartilaginous partition of the two nasal cavities is entire, with part of the falx or septum dividing the two lobes of the brain likewise. The œsophagus, as inclining naturally rather

Fig 1

Fig 2

to the left side, appears, therefore, whole in this section, and this influenced the making the division with the larger half or portion to the left.

a, The cerebrum; *b*, the cerebellum, with its arborescent appearance; *c c*, the medulla oblongata. The anterior *c*, shews its origin at the base of the cerebrum and cerebellum: the posterior *c*, depicts the spinal marrow, which is the continuation of the medulla, passing out at the great foramen in the occipital bone; *d*, the eustachian cavity, being the termination of the eustachian tube: it was covered by a membranous septum, which is removed to shew the cavity more completely; the letter *d*, is immediately upon a part of the os hyoides: the two vessels that run under and across it, are the carotid artery and jugular vein: posterior to it, is a muscle of the os hyoides; next to it, the lingual nerve; and behind these, are branches of the external carotid. The edges of this cavity form part of the pharynx, and are attached to the posterior portion of the occipital: to its lower edge the muscular fibres of the œsophagus are attached; and to its upper and posterior part, the muscles of the pharynx; *e*, the frontal sinuses divided by the partition, part of which is broken off, to shew the left of these cavities; *f*, the ethmoidal sinuses; *g*, the sphenoidal sinus; *h*, the cartilaginous partition of the nose; *i*, the vomer implanted below, into the groove of the palatine bones, and above, fixed into the septum of the nose; *k*, the cartilaginous substance immediately over the palatine bones, assisting in the division of these cavities and their formation; *l*, the palate, or roof of the mouth, with its folds or rugæ; *m*, shews the section of the posterior jaw, at the symphysis of the chin: above and below the muscular substance of the lips is seen, with the skin as a line over it; *n*, the section of the tongue, with its fibrous appearance, or the intermixture of tendinous fibres towards the root; *o*, its outer covering formed of epidermis, or skin, expressed by a white line around its edge: it is seen rough, and its roughness increases as it advances towards its base; *p*, is intended to shew the velum palati, or curtain of the palati, attached to the edge of the palate bone, and extending down in front of the epiglottis, forming a true valve to these parts, and demonstrating the reason why a horse breathes through his nose; *q*, the epiglottis, or cartilage, that covers the cavity of the larynx in deglutition; *r*, the larynx, or cavity, from whence the trachea commences; *t t*, the trachea, or windpipe, cut down the middle, composed of cartilaginous portions, being nearly, but not perfectly annular; *u u*, the pharynx, which is the cavity of the hinder mouth, divided by the curtain of the palate: the pharynx receives the left nostril at the anterior letter *u*; *v*, the internal coat of the œsophagus thrown into folds, which is a continuation of the cuticle, lining the tongue and mouth, and the farther continuation of which forms the cuticular, or insensible portion of the stomach; *x*, the muscular coat of the œsophagus, which arises from the edges of the membranous cavity; *y*, the cervical ligament, attached to the occipital bone, escaping the first vertebra, and attached strongly to all the rest; *z*, the cavity for the enlargement of the œsophagus in swallowing.

Figure the Second

Represents the right half of the head, with the velum palati, and the membranous pharynx removed, as well as the brain and spinal marrow; *a*, the cavity for the lodgement of the cerebrum, with its risings and depressions marked; *b*, the cavity within the occipital, for the lodgement of the cerebellum; *c*, marks the passage through the occipital foramen and atlas; *d*, the frontal sinuses exposed, the bony septum dividing the right from the left remaining with the right portion, but within are seen bony pillars supporting these sinuses; *e*, the superior turbinated bone forming the upper cornet of the nose; *f*, the inferior turbinated bone forming the under, or posterior cornet of the nose; *g*, the ethmoidal sinuses, which in their natural state are covered with a thick brownish substance, firmer than mucus, and adhering closely to the bone; *h*, the sphenoidal sinuses; *i i*, the os hyoides; the superior letter expresses its larger branches, as the lower does its lesser: the bottom portion is its fork, and embraces the larynx; *k*, a branch of the carotid going to the base of the skull: next to it is seen part of the jugular returning the blood from the sinuses: the substance seen crossing these is the lingual nerve; *l*, the carotid artery forming its divisions; *m m m*, the digastric

muscle, with its two fleshy attachments and intermediate tendon; *n n n*, the right maxillary gland: the posterior letter shews its body which lies within, and under the parotid, as seen in Plate IV: the middle *n*, shews its duct passing at the posterior, and under part of the tongue; and the anterior letter shews the termination of this duct in the mouth under the tongue, a little distance from the front teeth: each duct terminates by a little mammillary process, which the farriers call the paps; *o*, the branch of the carotid artery, that passes over the jaw, and forms the most convenient part for feeling the pulse; the fingers being applied exactly where the letter is placed; *p*, the left half of the tongue; *q*, its root dissected from its attachment to the os hyoides; *r*, a probe shewing the passage of some of the vessels of the brain; *s*, the optic foramen of the sphenoid bone; *t*, another foramen permitting the passage of the cerebral vessels; *v v*, the most anterior of these, shews the exit of the olfactory nerves, and the posterior the transverse septum, dividing the cerebrum from the cerebellum; *u*, is intended to shew the retraction of the skin of the ear, with the concha, or cartilage of that organ underneath, as it appears in the operation of cropping; *x x*, the eustachian cavity removed, and the edges composing it, with the pharynx likewise, and extended as far as the velum palati, and the end of the palatine bones; *y*, the two tables of the skull, with the intermediate cancelli, or diploe; *z*, the pericranium lining the skull.

Of the Neck in general.

The neck of the horse is a very considerable part, assisting him in progression, by forming a counterpoise to the great weight and extent of his hinder parts: it is likewise useful in enabling him to reach his food from the ground. This part may be divided into external and internal parts; the first of which are, the mane, the general hair, the common integuments, the cervical ligaments, the muscles, the jugular veins, with the cutaneous vessels and nerves. The more internal parts may be considered to be the cervical vertebræ, the spinal marrow and nerves, the vertebral vessels, the carotid arteries, the glands and proper nerves, with the trachea and œsophagus. The neck extends from the upper part of the head between the ears above; and below from the termination of the channel, and the implanting of the lower jaw; and terminates superiorly at the withers, and below at the breast: speaking anatomically, it comprehends all that space between the occipital bone above, and the angle of the posterior jaw below, to the spinous processes of the first dorsal vertebræ above, and to near the articulation of the humerus with the scapula below. The common integuments of the neck are similar to those of the other parts of the body.

Parts of the Neck.

The *cervical ligament* is a very strong substance, placed between the head and the body, as a support to the head. The muscles of the neck are very strong; but muscles, if constantly kept in action, tire; nature has, therefore, given a substance that has great strength, without being liable to fatigue, by which the head is constantly kept supported. This substance differs from ligament, in some respects, as it is elastic, by which the motions of the head are much accelerated. It is strongly attached, by its anterior extremity, to the pos-

terior part of the occipital bone; passing over the first cervical vertebra, without attaching itself to it, but is intimately connected with the spinous processes of the second, third, and fourth; the stronger portion of it here passes forwards to reach the spinous processes of the dorsal, but it sends down a kind of double lamen of ligament, to unite with the rest of the cervical bones. (*Vide Plate* III.) The *muscles of the neck* are all described in the Myology, to which we refer the reader; it is sufficient to say, they are numerous and extensive, and most of them have some attachment to the cervical ligament. In surgical operations upon this part, it becomes necessary to keep in mind, that the fibres of these muscles run almost all of them nearly longitudinally. The *jugular veins* run one on each side of the neck superficially, on the outside of the trachea, towards the lower parts of the throat; a few inches before they reach the angle of the posterior jaw, each divides into two principal branches. (*Vide Plate* III *and* IV.) The *cutaneous vessels and nerves* are branches given off from the carotid and vertebral arteries, returning their blood by the jugular and vertebral veins. The *nerves* are from the cervical branches and the intercostals.

The *internal parts of the neck* are, first, the seven cervical vertebræ, which have been fully described in the Osteology; they run down this part imbedded in muscles: the first three are situated towards the superior part of it, the remainder gradually gain the middle portion; and the space between is filled up by the cervical ligament and muscles. The *spinal marrow* descends along the great cavity within the substance of these vertebræ, and the cervical nerves are given out between the notches formed by the junction of each of their bodies. The *vertebral vessels* pass through a foramen in their transverse processes, except of the last, in which one, the vessel passes under the process. The *carotid arteries* extend up under the jugular, just above the trachea, very near the œsophagus, and near to it run up the par vagum and recurvent nerves. The intercostal nerve likewise passes down within the neck. (*Vide Plate* III, *b. Fig.* 2.) The *internal cavity:* There is internally above, where the œsophagus lies, a cavity formed, that has seldom been noticed; but which is nothing more than a species of interval left for the purpose of allowing the œsophagus to distend itself in the act of deglutition. (*Vide z. Fig.* 1, *Plate* III.) The *trachea, aspera arteria,* or *windpipe,* is a large canal arising from the cricoid cartilage of the larynx, and which extends down the anterior part of the neck superficially for some distance; from whence it passes into the thorax, between the duplicatures of the mediastinum: it is composed of cartilages, which form segments of circles, leaving a space that is filled up by a membrane: these segments are placed one above another, and connected by their edges to the edges of those below, by strong ligaments. By means of this structure the trachea is perfectly flexible, and yet it is always kept open: externally it is united to the surrounding parts by cellular substances, and on the inside it is lined by a very vascular mucous membrane, the secretion of which

defends it against the effects of the cold air. It is furnished with vessels from the carotids and jugulars, and with nerves from the eighth pair. Being continued down into the chest, to about the third or fourth dorsal vertebra, it divides into two branches, which are called bronchia: the first branches of which usually form segments of circles similar to the trachea, but they soon become completely circular; and, as they proceed, they become less and less in diameter, so that they can, in the collapse of the lungs, easily pass one within the other. They will be more fully treated of hereafter. (*Vide t t. Fig.* 1, *Plate* III.)

The *œsophagus.*—The pharynx, which we have lately described, is a funnel-like cavity, ending in a tube, partly membranous and partly muscular, called the œsophagus. Its course from the pharynx is before the cervical vertebræ, and behind the trachea, between the carotid arteries; inclining a little to the left side, it penetrates the chest between the layers of the mediastinum, and continues in a similar direction along the dorsal vertebræ, passing through an opening in the diaphragm, and at length terminates in the stomach. Its coats are, first, a slight and cellular one, which it retains while in the neck; but which in the chest gives place to a covering from the duplicature of the mediastinum. Its second coat is muscular, and made up of several strata of external, longitudinal, and internal fibres, which have a spiral direction. The inner coat is cuticular, and but loosely connected with the muscular: for as the elastic powers of this coat are but small, and the distention of the muscular coat considerable in the act of swallowing; so this inner tunic is wrinkled into folds in a state of rest; whereby, when the muscular fibres expand, this part can open, so as to allow the passage of the food, and yet prevent the too great expansion of the tube; this skin-like coat is continued into the stomach, over one half of which it is expanded. The want of elasticity in this cuticular portion, and its looseness of connexion, are well shewn by a transverse section of the tube when the muscular recedes from the cuticular coat. (*Vide x, x, y. Fig.* 1, *Plate* III.)

The Thorax in General.

The second great cavity of the body is termed *thorax* or *chest.* It is bounded anteriorly by the vessels filling up the opening between the two first ribs; posteriorly by the diaphragm; and laterally by the ribs; above by the vertebræ, and below by the sternum. Its parts are reckoned external and internal. The external parts are, the integuments, muscles, and bones. The internal are, the pleuræ and mediastinum, the thymus gland, lungs, heart, vessels, and nerves, with the diaphragm. The integuments are common to those of other parts. The muscles we have treated of in the Myology; and the bones are formed of the vertebræ, ribs, and sternum, which have been likewise explained.

Description of Plate IV.

Represents the viscera of the chest and belly of a horse, and such other parts as come readily into view, when the subject is laid on its back; and elevated before, to meet the sight.

The skin is raised and thrown back; the cutaneous muscle is removed from the neck, and the cutaneous muscles of the face also, by which the jugular vein, the vessels of the face, and the parotid duct, are brought into sight. The attachment of part of the masseter muscle is removed likewise, to shew the course of the temporal artery and vein, which has been done to demonstrate the error that has arisen in the practice of some veterinarians, who, mistaking this branch as the source from whence the eye is furnished, have directed its division in inflammations of that organ: when from this view it will appear that such practice is useless, as this ramus, called temporal, is wholly given to the masseter muscle.

In the chest the sternum has been removed, with the pericardium, mediastinum, and pleura; by which means, the lungs, heart, and principal vessels, are brought into view, as well as the course of the thoracic duct. In the abdomen, a section is made through its whole length, and the symphysis pubis divided to shew the contents of the pelvis. It is needless to remark, it is a male subject, and of that kind termed a whole horse; that is, it is an uncut animal, with the testicles perfect. A male subject was chosen for this view, and the parts of the horse, purposely selected in preference to those of the mare, as being of more consequence to the practice of the veterinarian. The intestines have been removed, dividing them below the entrance of the biliary and pancreatic ducts; and about a foot before the termination of the rectum. These intestines appear in another view; and which are the only parts removed, the remaining viscera appearing in their natural situation; the stomach only is slightly distended to give an accurate idea of its form, but not to its full extent, that the neighbouring parts might not be hid. As the parts described are extensive, and the references numerous, so it is necessary to premise, that they will be referred to in the following order, and to which the letters will correspond: Parts of the head, neck, and chest—Contents of the abdomen—Organs of generation.

Parts of the Head, Neck, and Chest.

a, the masseter muscle, upon the upper part of which is seen spread a branch of the fifth pair of nerves; above, its attachment to the spine of the molar and maxillary bones, has been raised to bring *b*, the temporal artery and vein, into view, which are seen above the nerve, and are distributed wholly to the masseter, but contribute nothing to the support of the eye; *c*, the anterior cartilage of the ear; *d*, the maxillary artery, the maxillary vein, and the duct of the parotid gland. The most anterior, or vessel nearest the mouth, is the external maxillary artery, which is that branch of the carotid seen passing over the jaw at *o*, Fig. 2, Plate III, and which forms the most convenient part for feeling the pulse of the horse. The middle vessel is the parotid duct, piercing the molar muscles, and entering the mouth above the second molar tooth, or second upper grinder. The innermost of these vessels crossing the last, is the external maxillary vein, which receives by one branch the blood of another artery of the masseter; by a second, the blood of the temporal artery; and by a third, that of the nasal arteries; *e*, *e*, the upper and lower portions of the parotid gland: its duct is pointed to by the letter, and always proceeds in front of the gland over the inferior part of the lower jaw, to terminate in the mouth; *f*, the superior division of the jugular; *g*, the inferior division of it, which forms the external maxillary vein. The junction of these two principal branches of this vein forms the trunk of the right jugular, which unites with the left, to enter the anterior cava; *h*, the anterior vena cava formed of these, with the axillaries; *k*, the aorta with its division into anterior and posterior; the anterior goes upwards and forwards, and the posterior becomes lost in the view, behind the heart; *l*, *l*, the axillary arteries; *m*, the united trunk of the carotids arising from the right axillary artery, and dividing into the right and left carotids; *n*, the entrance of the thoracic duct into the left jugular; *o*, *o*, *o*, the lobes of the lungs: on the right side is seen a small lobe with a larger

one; the lesser lobules do not appear; *p*, the right or anterior ventricle; *q*, the left or posterior ventricle, the portion between is the fat bisecting it; *r*, the right auricle, from which the two vena cavas arise; *s*, the left auricle; *t*, the pulmonary artery, dividing into a right and left; the left is seen to pass under the posterior division of the aorta; at this part is situated the membranous canal or communication between these vessels, called canalis arteriosus, which is open in the fœtus, but shut in the adult; *u*, the posterior cava; *v*, the posterior aorta; between these are seen, to the right, the vena azygos, and, to the left, the thoracic duct.

Viscera of the Abdomen.

a, *a*, the diaphragm. The middle and lighter portion, to which the ligament of the liver is attached, is the tendinous part; and the light portions round the circumference are likewise tendinous intersections; *b*, *b*, the lobes of the liver; *c*, the biliary duct arising at once from the liver, without any gall bladder as in other animals; *d*, the stomach with the omentum attached, and the vessels ramifying on it; *e*, its pyloric orifice ending in the duodenum, into which are seen the biliary and pancreatic ducts entering; *f*, the pancreas, the remaining portion lies under the omentum, *g*. From this view it will be seen that the omentum in the horse is small to what it is in the dog and many other animals; it is attached to the stomach along its inferior and posterior curvature, and a portion is kept up by a pin stuck into the spleen to shew that viscus; *h*, the spleen with its granulated appearance; *i*, the posterior cava forming the emulgent veins; *k*, the posterior aorta giving off the anterior mesenteric trunk, to which the united trunk of the lacteals is attached to gain the receptaculum chyli; but neither does the anterior mesenteric always present itself in this situation, nor do the united trunks of the lacteals always accompany it. Immediately beyond are seen the small emulgent arterial trunks given off: the emulgent artery and vein furnish the renal vessels; *l*, *l*, the right and left kidney with the emulgent artery and vein, ramifying into each. The left is seen lower than the right, being pressed down by the spleen; *m*, *m*, the glandulæ renales receiving their vessels from the emulgents; *n*, *n*, the ureters seen passing out from the pelvis of the kidneys, and in their course crossing the vasa deferentia; *o*, *o*, the spermatic vessels formed of an artery and vein each: the left spermatic vein is seen arising from the emulgent vein of that side, by which means it avoids the distance it would otherwise be forced to travel by arising from the cava, which is situated to the right of the spine; *p*, *p*, the lymphatic vessels bringing the lymph from the lower extremities to pour it into the receptaculum chyli; on the left side they proceed up from the pelvis in company with the iliac vessels and the aorta; *q*, part of the rectum lying immediately behind the bladder; *r*, *r*, the division of the aorta into external and internal iliacs, with the like division of the cava.

The Organs of Generation.

a, the bladder cut open to shew the termination of the ureters within it at *b*. These ureters are seen proceeding from the testicles and crossing the spermatic rope; *c*, *c*, the enlargement of the vasa deferentia before their termination into the urethra alongside of the opening of the vesiculæ seminales; *d*, *d*, the vesiculæ seminales; the right is cut open to shew its termination within the urethra alongside of the vasa deferentia; but in such a manner do the ducts of these two parts run alongside, and terminate parallel to each other, that there is no communication between the testicles and them; nor can they ever be intended as a reservoir to the semen, as has been asserted; *e*, marks the termination of the vasa deferentia, and the vesiculæ seminales opening into the same part of the urethra by two little orifices. Immediately behind these, lying along the neck of the bladder, about the size of a goose quill, and about two or three inches long, is what the French call a middle vesicle. It terminates usually by one of the openings common to one or the other lateral vesicle; *f*, *f*, two glandular bodies that correspond in situation, but not in structure, to the human prostates; *g*, *g*, the two antiprostatæ or Cowper's glands covered with the accelerator muscles: the right is cut open to shew its cavity. The little ducts of these glands, called lacunæ,

are seen within the urethra; *h*, *h*, the left testicle, with its rope coming through the ring of the oblique muscle, and covered with its vaginal coat and the cremaster muscle, which descends along its inner side, and is expanded over its upper part; *i*, the right testicle removed from its passage through the abdominal ring, and its vaginal coat laid open; the body is seen with its vessels ramifying on it, being alternately straight and waved upon its albugineous coat; *k*, that part of the testicle called its appendix or epididymis, communicating with the main body by the tubuli seminiferi, and passing up to form the vas deferens; *l*, the convolutions of the spermatic vessels before they enter the testicles; *m*, *m*, the corpora cavernosa of the penis, with its muscular fibres intermixed: between the two, lies the urethra, the muscular fibres of which are seen running in the direction of that canal; *o*, the body of the penis divested of its outer coverings; *p*, the glans: the dark part shews a portion of the sheath immediately investing it, and thrown into folds to admit of the increase of the dimensions of the penis; *q*, the termination of the urethra by a loose floating extremity, which is fixed in a cavity peculiar to the horse; the outer part of the glans is laid open to shew this more distinct, as well as the internal structure of the glans itself.

Viscera of the Chest.

The *pleuræ and mediastinum.*—When the chest is opened, a smooth polished membrane is seen, covering its whole surface, and likewise investing its contents. Each side of the chest has its particular *pleura*, which is distinct from that of the other by the intervention of the cellular membrane. The two lamen are attached to the sternum; when uniting by cellular substance, they form what is termed the inferior mediastinum: they then separate to pass over the heart and pericardium, from whence they are reflected over the lungs; when on their return, again uniting, they form the superior mediastinum. Near the vertebræ they again separate, one portion passing over the spine on one side; the other passes over the spine on the other side, to line the whole cavity of the chest. By this division a tubular opening is formed, in which is situated the thymus gland, aorta, vena cava, vena azygos, ductus thoracicus, and œsophagus.

There are therefore two reflections of the pleura on each side; one connected to the surface of the chest, the other to the surface of the lungs, forming by this means a distinct cavity for each lung, in which is contained a small quantity of fluid, termed *liquor pleuræ*. It is the diseased increase of this fluid, that forms hydrothorax, or dropsy of the chest, which is so common a termination of inflammation of the lungs. If by accident the bag in which the lung is contained is cut into, the lobes on that side usually collapse, and are rendered useless by the entrance of the external air; this appears, however, not to be the constant effect.

The *mediastinum* is nothing more than the duplicature of the two pleuræ, which divide the chest into two nearly equal portions: the right being rather the largest, in consequence of the situation of the heart, but the difference is not so great as in the human. This natural division is of the utmost importance to the animal, for by accidents in which the chest becomes penetrated, if the total collapse

of the lungs was to take place, death must ensue; but life can be carried on by one lung, when an injury to the other has rendered it useless. By this wise provision, ulceration sometimes confines its effects to one side of the chest only, and the animal becomes supported finally by the other. These parts are supplied with vessels, and with nerves from the intercostals; but the branches of the latter are but small, consequently its sensibility is small likewise, except under inflammation. It does not appear that this membrane is disposed to take on inflammation independent of the lungs, in the horse.

The *thymus* is a spongy and apparently glandular body, placed anteriorly between the duplicatures of the mediastinum, contiguous to the sternum, aorta, and vena cava, at their division. The shape is irregular, sometimes appearing formed of two lobes, at others seeming one mass: its substance in the young subject is cellular, and its size considerable, and at this time it is said to contain a small portion of whitish fluid. As the animal advances in age, its colour changes, it becomes less, and at last it is scarcely discernible. No excretory duct has ever been discovered, and neither in the horse nor human is its use known*. It is this substance that forms the sweetbread of veal. La Fosse says, it is sometimes diseased in calves, and occasions a tumour that proves fatal to them. It has a small artery and vein, given off usually from the internal pectoral.

The *diaphragm* or *midriff* is a most important muscle†, and, like the heart, is in constant action during life. It is a broad, thin, tendinous, and fleshy expansion, and is so situated as to form a complete septum or division between the thorax and abdomen, not completely elliptical, for its upper part, opposed to the back, extends considerably farther towards the lumbar vertebræ; while the anterior part is attached to the sternum, consequently its situation is rather oblique. In a state of rest, it is anteriorly convex, and posteriorly concave; that surface opposed to the thorax being covered by the pleura, and that towards the abdomen by the peritoneum. From some peculiarities in the disposition of its fibres, it is sometimes described as two muscles; the great and little diaphragm. The anterior or larger portion arises by distinct tendinous fleshy fibres from the ensiform cartilage, from the posterior extremity of the sternum, from the internal surface of the cartilages of the true ribs, by portions which admit of small tendinous digitations between them; passing upwards, and posteriorly attaching itself to the false ribs, its fleshy portions terminate near the spine. From all these origins, the fibres are directed like radii from the circumference of a circle to a tendinous centre. This tendinous middle portion is perforated by a triangular hole towards the right side, a little inferiorly to the spine, for the passage of the vena cava.

* As the thymus gland in dogs is large, and the thyroid small; and as it usually happens, that when one is considerable, the other is the reverse; so we may reasonably suppose that their use is the same.

† Nobilissimus post cor musculus.—*Haller.*

The superior, posterior, and lesser portion of the diaphragm, fills up the space left by the larger; arising by different portions from the first, second, and third lumbar vertebræ, of which the two central ones are called its *crura* or *pillars;* between which an interval is left for the passage of the aorta, called its *hiatus*, and for the vena azygos, and thoracic duct. A little to the left is situated the third opening of the diaphragm, formed from the decussation of the fibres, and giving a passage to the œsophagus and par vagum.

Vessels and nerves of the diaphragm.—The aorta, in its passage between the crura, usually gives a branch or two to this muscle; besides which, it receives other rami from the arteries of the chest. (See *Arteries.*) Its veins are infinitely larger than its arteries, that the blood might not feel the effects of pressure in its motions; they finally pour their contents into the vena cava. The phrenic nerves arise from filaments given from the fourth, fifth, and sixth cervicals; there are, besides, other small branches given from the great sympathetic, but whose office seems to be rather to preserve the general sympathy between the whole organs, that exists in so wonderful a degree by means of this nerve, than for the motive powers of the diaphragm; for if the spinal marrow is wounded above the origin of the phrenic nerves, the animal dies from suffocation, the diaphragm losing its power, though the sympathetic branches remain entire. This muscle is the principal agent in respiration, which we shall more fully shew when treating of the lungs: the act of sighing also is principally brought about by its means; and in those animals who vomit, it is a considerable help. It is more subject to inflammation in the horse, than in the human; for when any of the abdominal viscera are inflamed, this usually partakes.

The Heart.

The *pericardium* is a membranous sac surrounding the heart, similar in structure to the pleura. Its outer surface is attached to the mediastinum, between the duplicatures of which it is situated; and its inner surface is contiguous, but not continuous to the heart; for there is a fine fluid interposed. It appears composed of two laminæ, and is attached above to the vessels, over which it is reflected, giving them a covering; and below to the sternum; but not, as in the human, to the diaphragm: for the horizontal position of the animal alters in some measure the position of the heart. Its inner surface secretes a very fine fluid, called *liquor pericardii*, which thus preserves a freedom of motion between the heart and sac: in health this is about an ounce in quantity; but should it become much increased beyond this, it constitutes dropsy of the pericardium; which is, however, not a frequent disease in the horse.

The *heart.*—This important organ appears a composition of muscular fibres combined with membranous matter, to form a conoidal body with four principal cavities, and several openings, common and proper. It is situated within its sac, between the lamen of the mediastinum; with its base in a line with the dorsal vertebræ, and its

apex, which is slightly curved, directed to the left of the sternum between the eighth and ninth ribs: so that it is situated rather more to the left than to the right. Its sides, which are rather flattened, are right and left, and its edges by this means form an anterior and a posterior. Two of the cavities we have mentioned, are situated immediately within the muscular body, and are its ventricles; the two others are rather appendages, and form its auricles. It has a smooth exterior covering, which arises from a fine membrane, appearing as a reflection of the pericardium; and its base is surrounded by a variable quantity of fat. Around its base, and between its ventricles, are seen the coronary vessels running in their various courses; and from the same part issue its vessels also, by which it is principally retained in its situation.

The *ventricles*.—Each ventricle opens by two orifices, one of which communicates with the auricles, the other forms the mouth of a large artery. The right ventricle opens into the right auricle and into the pulmonary artery, the left into the auricle and into the aorta; at the edges of these orifices there are valves. These two ventricles are separated by a septum, which lies neither directly across the chest, nor is its direction truly anterior and posterior, but is oblique; so as to form the cavities as properly into an anterior and posterior ventricle, as into a right and left. The *right or anterior ventricle* is larger than the left in the adult horse; in the new-born colt it appears to be smaller; but many impediments to the circulation tend to stretch and increase it through life: it likewise does not extend quite so far to the apex as the other. This ventricle is strengthened by fleshy pillars, called *carnea columni*, and also by *tendinous cords* that attach to the valves of the auricle and ventricle, and by which the mechanism of these parts is much strengthened. The *left or posterior ventricle* is much thicker and stronger than the right, and its capacity less: it however is something longer than the right, occupying the apex; whereas the right ends before it arrives there. The inner surface of both these ventricles, but in unequal proportions, are very uneven; being formed into stringy productions from the fleshy and tendinous part, and into cavities dipping in between these: but these productions and inequalities are not so varied nor so considerable in the horse as in the human, though even here they are sufficiently diversified to afford an admirable proof of the importance of this organ, and the great pains nature has bestowed to give it mechanical strength.

The *valves*.—We have already noticed, that each ventricle has two orifices, an arterial and an auricular; and that their openings are furnished with a structure, whereby the blood is prevented from passing but one way; which structure is called their valves. Those of the arterial openings are called *semilunar;* and those of the auricular, *tricuspid*. The auricular valve of the left ventricle is called *mitral* likewise. Their structure appears to arise from a duplicature of the inner coat of the part, forming a kind of fold, or several folds, with some fleshy fibres, which are differently disposed, according as

they permit the entry of the blood or its exit. The membranes which form these valves in each cavity, are attached so as to project forward, and both of them are connected by the tendinous strings from the sides of the ventricles: as either ventricle contracts, the blood is driven into the artery, which communicates with that ventricle; and the tendinous cords being relaxed, the sides of the cavity are brought nearer to each other, the valves close the opening into the auricle, and the passage that is alone left, which is the artery, receives the blood. The heart after this contraction becomes again relaxed, by which means these tendinous cords are again stretched out; and the valves of the auricle being drawn downwards, the blood is poured by the veins into the cavities.

Vessels of the ventricles.—The left or posterior ventricle sends out a large artery, which is termed the *aorta;* it proceeds but a little way when it divides into two, which in the horse are very justly termed anterior and posterior. The first is distributed to the head and anterior extremities; the other furnishes the trunk and posterior extremities. The right or anterior ventricle gives out the pulmonary artery, which runs upwards and forwards by the side of the aorta, and then dividing into two trunks is distributed to the lungs. (See *Arteries.*)

Auricles.—The auricles are muscular and membranous appendages situated at the base of the heart, corresponding to the two ventricles, and having a septum between, so that there is, correspondent with these, a right and left. The left or pulmonary auricle is placed above, and opens into the left or posterior ventricle; and the right in the same manner communicates and is situated upon the right or anterior ventricle: externally, they appear but one cavity, and are unequally divided; by which the right is much larger than the left, and are so placed, that there is little seen on the left side. They are within, very uneven, but smoother on the outside, with indented edges like a cock's comb, and hanging down like a dog's ear. The *right and larger auricle* is irregularly rounded, and has two openings; an anterior and posterior, which receive the anterior and posterior vena cava. The *left auricle* is considerably more muscular than the right, though its size is less: it is irregularly square, and has a small appendix similar to the right. Into its angle the pulmonary veins pass; and it has a common opening with the ventricle, as has been described. The substance of the auricles is both membranous and muscular, and they are also furnished with a few tendinous and fleshy cords to strengthen them.

The heart, in common with other organs, is furnished with blood vessels that supply its substance with blood; these are termed coronary. The *coronary arteries* are two branches which are given off from the aorta, immediately after its origin, and are distributed around the base of the heart, and between the line of separation of its ventricles, in principal trunks and lesser divisions to every part of it. The blood is returned in part by the coronary veins, and part, appears to penetrate the substance of the heart, and to be

poured into its cavities. The cardiac plexus, which is formed from the par vagum and intercostal, furnishes the heart and its vessels with nerves.

Circulation of the Blood.

The heart is the principal organ by which the passage of the blood is effected through the body, whereby all its parts are formed and nourished. Though the antients knew the use of the blood, and though they were well acquainted with the organs concerned, they had a very imperfect idea of its motion; and it was left to the immortal Hervey to demonstrate to the world that wonderful and complex route which this fluid takes through the animated machine, to the accomplishment of its various purposes. The course the blood takes in the unborn colt, and in the adult or grown horse, is very different; the first forms the fœtal circulation, and which we shall describe when we treat of the parts of generation. The adult circulation has been divided into the lesser, or pulmonary; and the greater, or general.

The *lesser, or pulmonary circulation.*—The blood of the two cavas, being poured into the right auricle, and being assisted by its gravity, irritates that sac to contract, so that the valves of the right ventricle are forced close to the sides, and then this sac becomes filled. The moment it is thus received, the sensible cavity of the ventricle is stimulated to contract on it, which shuts up the tricuspid valves that permitted its entry, and which cannot now be forced open, being held firm by the tendinous cords from the sides of the ventricle. The contained blood, therefore, now seeks another course, and the very action of the valves proceeding from the sides to the axis of the heart to shut the ventricle, opens the pulmonary artery, by pressing the loose sail-like edges of its valves towards its sides, and leaving its cavity extended, into which the blood, by the contraction of the ventricle, is forced. The blood then received into the pulmonary artery proceeds to be circulated through the lungs, around the air cells, and is taken up and returned by the pulmonary veins; nor can the blood once received by the pulmonary artery return again to the heart; for the semilunar valves, as soon as the ventricle becomes relaxed, are drawn down and prevent it. The pulmonary veins, therefore, receiving the blood from the right, or anterior side of the heart, by means of the pulmonary artery, carry it into the left, or posterior auricle; which, having received it, becomes stimulated to contract; when, by this means, it is forced into the left ventricle; and thus much of the motion of the blood is termed the pulmonary, or minor circulation, and which was known to many of the antients.

The *greater, or general circulation.*—The blood is prevented returning into the left auricle for the same reasons that were urged with regard to the right, the action of the mitral valves. The left ventricle having received the fluid, and being impelled to motion by its irritating quality, or some other cause, does in like manner with

the right contract, and drive its contained blood in the direction of its axis, which determines it towards its basis, where the valves of the aorta lie; which, by this means, being pressed upon, and the contents then finding a passage, rush from this left ventricle into the aorta.

It appears, that the contraction of the two ventricles happens at the same moment: therefore, that at the same time, that the blood is driven from the left ventricle into the aorta, the right ventricle impels it into the pulmonary artery; consequently the relaxations, likewise, seem to be alike in point of time; the period of the left auricle's receiving the pulmonary blood, being that in which the right auricle receives the blood of the cavas. These alternate contractions and dilatations are called its *systole* and *diastole*. The contraction of the part forming its systole, presses the blood into the arteries; which receiving it, become distended, and by the joint force of the heart, and their own power, propel it through all their various ramifications. Therefore, when the heart is in a state of contraction, or systole, the arteries are in a state of distention, or diastole: and it is in this state we feel that motion in them we term pulse. It is the contraction of the ventricles that gives the pulse to the heart; but it is the opposite state that gives the pulse to the arteries; for the elasticity of the external coat, having dilated the artery after the action of the muscular coat has ceased to contract, or its having overcome the contractile power of this muscular tunic, gives that bounding feel, or stroke, under the fingers, called their pulsation. The heart is stimulated into different degrees of action; or its contractions and dilatations are more frequent in some animals than in others. The smaller the animal, usually the more numerous are the pulsations: the irritability being greater, the heart is forced to make up in frequency what it wants in strength.

From all that has been said, it will be evident, that the two circulations, as they are called; form but one general circulatory course of the blood, sent to all parts of the body by the arterial distributions originating from the left side of the heart, and returned from thence by the veins into the right side of that viscus: from whence it is again sent to the lungs, and, circulating through them to absorb its vital principle, it is returned to the left side of the heart; from whence again it departs, by means of the aorta, to be distributed throughout the body: and this course does the whole blood take; and these laws influence it in every part, except in some few instances, in which the economy requires a speciality or deviation; as in its passage through the liver; the corpora cavernosa of the penis; and the cavernous sinuses of the dura mater.

The exciting cause of circulation, or the means by which the heart is influenced to contract, has been a subject of inquiry among the most ingenious physiologists of every age: and whether this organ has an inherent power of contraction within itself, or whether it gains it by any other means from without, as from the stimulus of its contents, has been a matter of almost endless dispute. But it

would seem from all that is known, that it both possesses an inherent contractile power, and is farther stimulated by its contents.

The Lungs.

Within the chest, on each side of the heart, are seen some spongy masses, which, when taken out of this cavity, and placed with the posterior portion in front, are by no means unlike the cloven foot of an ox in form. These masses are called the lungs, and are divided into a right and left; each of which has other lesser divisions, called its lobes; but which are not always the same in every subject: sometimes there is a larger and a smaller to the right side, and two smaller to the left side; at others the left side has only one considerable lobe, at its anterior part: the right lung, however, is usually rather more considerable than the left. Within the chest, the lungs exactly fill the cavities they are contained in, and are adapted by their figures to them: they are convex next the ribs, and concave towards the heart (which is received between their principal lobes); and flat towards the diaphragm. The pleura first lines the cavity they are contained in, then is reflected over them; and, finally, by its duplicature, it forms a septum, called the *mediastinum*, which shuts out all communication between one lung and the other, except by their blood vessels. Their colour varies according to the age of the animal: in the colt they are of a light lively hue; by age they become greyish; and in old horses they are of a granulated blue. Their outer covering is gained from the pleura, as we have noticed; their inner structure is cellular, and appears a composition of numerous vessels, united together by membranous substances. These vessels, of which their substance is made up, are principally air, blood, and lymphatic vessels.

The *bronchia*.—We have described the larynx, as being a cartilaginous box, situated in the back part of the mouth, behind the opening of the nose, receiving the air: the trachea is a continuation of the larynx, and divides into the bronchia, which appear at first as two great branches; but which gradually divide into all parts of the lungs, in the form of conical tubes, composed of cartilaginous portions, connected together into a circle: these tubes are internally lined by a vascular membrane which secretes the mucus of the bronchia; which in diseases of the lungs, as inflammation, becomes increased, and is then coughed up. As the ramifications of the air vessels become very minute, they change their cartilaginous structure, and are continued membranous; which membranous continuations terminate into little cavities, having a cellular substance between, supporting their structure. The pulmonary artery distributes its blood throughout the lungs; the trunks of which are formed to correspond in direction and manner of distribution with the air vessels, and finally end in a fine reticular texture, which surrounds these air cells. By venal ramifications the blood is conveyed back in the course of the arterial and air canals, till it is finally deposited in the left auricle, by the pulmonary venal trunk. There are lymphatic

vessels on the surface of these organs, and probably throughout their whole structure; but they are not very plentifully supplied with nerves, and their sensibility, excepting under inflammation, is not considerable. The pulmonary plexus furnishing them, is derived from the union of some branches of the eighth pair, with the great intercostal. From the great vascularity of the lungs, they are very liable to inflammations; which inflammations run towards their terminations much quicker in the horse than in the human, apparently from the greater strength of the arterial system in the horse.

Respiration.

A fœtus subsists by its communication with the mother, and receives the principles of its nutriment and growth from her, by means of the placenta; but as soon as born, the connexion with the mother is cut off, and it has to trust to its own organs for its further evolution and support. These are furnished by the lungs and chylopoetic viscera, which, while unnecessary to the animal, and unfitted to act on account of the media in which they were placed, remained passive. What first gives the lungs their stimulus to action; whether it originates from any species of nervous irritation, or from the stimulus arising from necessity, or from what other cause, is not to our present purpose to inquire: but that respiration, or an act like it, is necessary to life, we know from the effects that arise from the stoppage of it; and from the universality of this act in every being we are acquainted with: for in those animals in whom the organs are not demonstrable, we have reason, from analogy, to suppose their existence.

The air is an elastic fluid, that has a tendency to fill up every vacuum, by the superincumbent weight of its parts. The mass of air pressing upon the animal body is very great; and by whatever cause it is, that the muscles of the chest are first roused to act, they enlarge the cavity, and the air by this principle rushes in; and when it has once entered the lungs, they are never completely emptied from it again; and hence when they have made only one inspiration, they will swim in water, as being specifically lighter, in consequence of the air they contain, than those that have never received any air. The lungs themselves are passive organs, and have no power to act; but the enlargement of their cavity is brought about by the enlargement of the capacity of the chest; by which, they being cellular and cavernous, and communicating with the open cavity of the mouth and nose, become filled with the external air. The chest is enlarged in its circumference by the elevations of the ribs, and it is enlarged in length by the contraction of the diaphragm. The first rib being fixed, becomes a lever to the rest, which enjoy some motion by means of their articulation with the spine, and by the flexibility of their cartilages: this takes place in a much greater degree in the posterior ribs, from the increase of their circular form, and the peculiar attachment of their cartilages. The intercostal muscles being placed between, by their contrac-

tions, enable the middle of the arches of the ribs to ascend, turning the cartilaginous angle outwards: thus, the chest becomes materially enlarged: but this motion is less in quadrupeds than in the human, from this part forming a more imperfect cylinder to admit the application of the anterior extremities, and from the fixed position of the sternum. The greater capacity of the thorax is gained by the diaphragm: this muscle in a state of rest is convex towards the breast, and concave towards the abdomen; but when its muscular fibres contract, it becomes plane-like, which forces backwards the abdominal viscera, and by this means greatly enlarges the capacity of the chest. Hence it is that in brutes we judge of the state of respiration by the flanks.

As the diaphragm is inserted into the ribs, so in very strong action its force might overcome that of the intercostals, and by depressing the ribs, produce an effect opposite to the real intention; but its actions in ordinary inspirations are not sufficient for this, and such inspirations are sufficient for the purposes of an animal at rest: but when more than usual exertion is necessary, other auxiliary muscles are called into action, by which the tendency of the diaphragm to pull down the ribs is counteracted: these aids are the muscles situated on the chest, and inserted into other parts, as those of the scapula, neck, or humerus; but which assistant muscles appear called into action only upon particular occasions. The air thus received into the lungs expands their cells throughout, by which means the blood in the right side of the heart finds a ready passage through them by means of the pulmonary artery, and hence the opening between the two sides of the heart in the fœtus closes up. As soon as the lungs are nearly filled, an uneasy sensation is felt, which obliges the thorax to contract; the diaphragm relaxes, and the abdominal muscles shorten, by which the contents of the abdomen are forced against the passive diaphragm; the intercostals cease their action, and the chest is rendered smaller; by which the air is expired, or forced out of it. After a momentary pause, the blood becomes collected in the right side of the heart, owing to the resistance it met with in the pulmonary artery, from the collapsed state of the lungs; and this causes a plethora in every other part of the body; hence we can account for the fulness of the vessels of the head, the starting of the eyes, and flushing of the face in persons who meet with any temporary stoppage to respiration: should the obstruction remain permanent, some of these vessels frequently rupture. From this accumulation it becomes necessary for fresh air to be drawn into the lungs, forming a new inspiration: and thus the routine of respiration is carried on.

There is a certain consent, or proportion, between the action of the heart and that of respiration, in the ordinary state of the animal; but this proportion is not always the same. If more blood is sent to the heart by the pressure of exercise, the respiration is likewise accelerated: thus, in quick motion, or great exertion, there is a panting and quick breathing; the air is suddenly expelled, and

quickly returned, that no obstacle might remain to the passage of the blood: this becomes also necessary on another account, as the force of the respiratory muscles must be diminished when other muscles are in strong action; therefore, what is wanting in strength is made up in celerity; the auxiliary muscles in these cases can act but little, as their fixed points must be the chest, and their moveable ones the extremities.

The Nature and Properties of the Blood.

The nature and properties of this fluid belong to hygrology; but as it is so intimately connected with the parts just described, we shall consider it in this place. The blood was in the earliest ages accounted as of the greatest consequence in the machine: perhaps, the great stress laid upon it in the Bible, might not a little contribute to this, when men were strictly commanded to refrain from blood, because "*it was the life.*" But it is remarkable, that though the very great importance of this fluid was known to the antients, and to an alteration of its properties was attributed most of their maladies; yet they had no just conception of its motion through the body. That it had motion they were aware; but they in general conceived it to be like the ebbing and flowing of the sea, and that during sleep this was reversed. A century, before Hervey lived, the valves of the heart were accurately described. Favetus, likewise, who lived eighty years prior to him, noticed the disproportion of the pulmonary artery in the fœtus. Another antient author, who was a great theologist, and wrote on the Trinity, for which he was burnt, speaks, in his work, of the use of the pulmonary artery to the lungs, and of their absorbing from the air a subtle fluid.

Dr. William Hervey, an Englishman, who lived in the year 1628, published, at Frankfort, his grand discovery of the blood returning to the heart by the veins, which was before supposed to flow from the heart by them: and having once began his researches, he did not leave them till he gave us the true route and course of this fluid through the body; and he not only pointed out the motion of the blood, but he also first conjectured it had life*. An acquaintance with the secretions continued to increase our knowledge of the importance of this fluid; but its real nature and properties have been much further illustrated by that great anatomist and physiologist, Mr. John Hunter. He revived the idea of the *life of the blood*, and by the ardour with which he pursued the subject, made it his own; and if, by some, he has been supposed to have carried it too far, and attributed too much power to this fluid, and too little to the solids; it is to be remembered, that few pursue a subject without following it to the utmost limits; and that a favourite child is seldom viewed but on the bright side: to which it must be added, that he con-

* Hunc quoque apparet sanguinis principalitas, quod pulsus ex eo ortum ducat. Nec sanguis solum pars primigenia et principalis decendus est quod ab eo motus pulsus que principium orietur; sed etiam quia in eo primum *calor animalis* innascitur *spiritus vitalis* ingeneratur, et *anima* ipsa consistit.—*Harv. Exer.* 51.

stantly applied the whole of his theory to practice, and founded most of his ideas on experiment.

The blood forms a principal part of most animal bodies, and is of various colours; but in quadrupeds always red; circulating through every part of the body, by means of the veins, arteries, and heart. It does not appear to differ essentially in the various brute tribes, having in all, the same properties of preserving life generally; that is, the blood of one quadruped will support, under all its functions, another quadruped, as we learn by transfusion. In the horse there appears but little difference between his blood and that of other brutes, nor between it and that of man; except that the proportion of serum seems rather smaller; but even this is not invariable. The quantity that an animal contains, in proportion to his bulk, has been endeavoured to be ascertained: but the results have been various; nor can the truth be easily gained: in some instances the quantity appeared equal to one tenth of the whole; and in others again, not more than one twentieth of the whole. The quantities that have been lost in the human subject are immense. Haller relates a case where 75 lbs. were lost in ten days; and another, where 29 lbs. were parted with in four hours, which almost exceeds belief, and in which there is probably some mistake: a horse has lost 44 lbs. without apparent injury. The blood is, with regard to each individual, a variable fluid, appearing in different proportions at different times, and likewise varying in different parts of the body. It putrifies by a gentle heat, and, under some circumstances, effervesces. Blood is separable into a nearly colourless, and a red part, which separation is spontaneous out of the body.

The *cruor*, *crassamentum*, or *coagulum*, is composed of globular particles, which swim in the serum, like particles of oil in water, but when suffered to rest out of the body, unite together into a mass with most of the coagulable lymph. The coloured part of the blood contains much iron, and the colour is said to depend on the ferruginous particles it contains, as the change of colour it experiences during its passage through the lungs is supposed to arise from the oxidation of this metal. From observing that the red globules do not exist in every animal, it has been supposed, that this was the least essential part, and this the more so, as some parts that have much life, yet want red blood. Mr. Hunter, however, thought it connected with strength, as it is found in greatest plenty in those who are strong; thus muscles have a great deal of it, and as they become pale, they become weak. Butchers bleed their calves, to deprive them of their red colour, and make the veal white; and hence it would appear, the red globules are longer in forming than the other parts. The other portion of the coagulum is what is termed the lymph.

The *coagulable lymph*, which forms the other portion, is thought to be the most essential part of the blood, having undergone the most complete animalization, and which, by the action of the vessels, becomes framed into all the solid parts of the body: it appears

to be that part termed cheese in milk; and the white of eggs is found to be principally composed of it. It forms the callus of bones, and can become organized whenever extravasated, either by its own specific action, or by the action of the solids upon it. It readily coagulates, is soluble in alkalies, but insoluble in water, oils, or ardent spirits. The coagulation of this part appears in direct proportion to the weak action of the vessels: therefore, whenever they act strongly, whatever may be the general state of the system, the coagulable part coagulates more slowly; and by this means the red particles, which at other times it holds suspended, fall to the bottom: but the lymph being now separated from them, forms on the top of the crassamentum, and is that which is termed the buff. Now, as the flowing of the blood from a small orifice, and slowly, assists its coagulation; we are in such cases deprived of this appearance, by which it is that we are enabled to judge of the strength of action in the vessels, and the consequent inflammation. This, therefore, is one principal reason that medical writers are so strenuous in recommending in pleuritic, or other strong inflammatory cases, that the blood should be drawn by a full stream from a large orifice, that it may not present a false indication.

The *serum* is slightly saline, less putrefactive than the red part, or than the coagulable lymph, and is yellowish, or sometimes of a cloudy colour. On suffering a quantity of blood to remain at rest, it spontaneously separates into a firm mass, and a fluid part. The firm mass is principally composed of the coagulable lymph, and red globules; the fluid is the serum. Its fluidity exists in every degree of heat, between 30 and 160 degrees Fahren. ther.; with a less heat it freezes, in a greater it coagulates. It appears chemically composed of albumen, gelatin, saline matter, and a considerable quantity of water. The serum is in smaller proportion in the blood of the horse than in that of man: its principal use is supposed to be to dilute the red parts of the fluid; and hence, when we say the blood is diluted, it has a larger proportion of serum, and is not referable to attenuation, or a thin state of it, which is a part of the old humoral pathology. This distinction should particularly be kept in mind by the student.

The *blood*, therefore, is this compounded fluid made up of these several parts; and which, considered as an aggregate, is a most essential component of the animal. All parts of the body are formed of it; and all parts of the body can be resolved again into it, by means of the absorbents; hence we must conclude that there is a very intimate connexion between the solids and the fluids, and this led Mr. Hunter to consider both as governed by the same laws. The reasons that induced him to form this opinion, and the facts whereon it was founded, are detailed at large in his work on the blood: and as his admired writings have produced almost an entire change in our ideas of the relations subsisting between the solids and fluids; so it is essentially necessary, that the veterinary student should possess himself of this work; and the more so, as all the actions of disease are very

generally referred to the laws he has laid down, but which we have not room to detail here. The universal adoption of these doctrines has made it also very generally supposed, that inflammation is the only disease to which blood is liable. Among the antients, an affection of the fluids of the body, but particularly of the blood, was supposed a principal cause of most diseases; but the overthrow of the humoral pathology, began by Boerhaave, continued by Cullen, and completed by Hunter, occasioned the different diseased affections to be ascribed to a vitiated action or derangement in the solids. Nevertheless, it appears that this system has been carried too far; and from many known facts it is evident the fluids are not exempted from disease any more than the solids; and that the blood under some circumstances is also specifically affected. It is through the medium of poisoned blood that animals become rabid; and from the same source horses become glandered, as we know from the readiness with which this disease may be produced by transfusing the blood of a glandered animal into the vessels of a healthy one: numerous other proofs might also be adduced.

The Action of the Air on the Blood.

We have every reason to suppose, that the blood is constantly wasting; for it tends to the support and growth of parts. Admitting this, it becomes necessary it should have sources of renovation and restoration, which appear to be derived from the lungs and the chylopoetic viscera. By the first it is altered and meliorated, and by the latter it is renovated in point of quantity. The blood seems to acquire from the air a certain part, or possesses itself of certain properties, whereby its qualities are brought back from a venal to an arterial state; which is the only one that seems fit for the purposes of support. When venal blood is exposed to the action of the air, it soon loses its dark hue, and becomes florid and bright in the part exposed to the atmosphere; and, as the other portions are successively exposed, they become in the same manner brilliant. If venal blood also is placed in a bladder, those parts in contact with the bladder become brightened. If blood in the pulmonary artery is examined, it will be found dark, impure, and venous; when, on the contrary, examined in the pulmonary vein, it will be found bright, florid, and arterial. We likewise observe, that the same changes, as far as regards colour, take place on the blood in its passage through the lungs, by means of its exposure to the action of the air in the bronchial cells. That this arises from the air we know; for if we hang or strangle any animal, and then open each side of the heart, we shall find the blood in both equally black and venous. It is also certain that the change of colour is not the only alteration that the blood receives; otherwise it would be a change only on the least useful part of the blood (i. e. the red globules): but it is more probable that it is an effect wrought on the blood in general; or perhaps on the coagulable lymph in particular: and this appears the more likely, as this change is found as necessary in animals whose blood

is not red, as in those in which it is. Innumerable proofs may be brought forward to prove, that some important alteration is effected in this fluid in its passage through the lungs; every experiment, almost every phenomenon of animal life, shews it. The difference between the blood in the arteries and veins, and which blood we know is all derived from the same source, is a most strong and convincing proof. If a large artery is taken up, the blood in it, which was before florid, soon becomes dark: the veins likewise have the blood in them rendered still darker, if its course is retarded or stopped; thus on tying up the neck to bleed, the fluid that first issues, particularly if the ligature has been tight or remained long, is very black; and which occasions farriers to say, the blood is very bad; but as it continues to flow, it becomes more bright, as having been less under this suspension, which the same gentry then allege, arises from the horse having parted with his bad blood. It is likewise usual, when it trickles down, to see a florid and dark stream; the florid part arising from some of the capillary branches which have not yet been deprived of their oxygen.

That the blood becomes altered and changed in its passage through the lungs, it is, therefore, presumed is sufficiently proved; and we have shewn, that it is generally believed that this change is not only an alteration of its colour, but an absorption of a vital principle. This vital principle is supposed to be oxygen, or the base of atmospheric air; and that the decomposition of caloric, by means of carbon from this oxygen base, is the source of *animal heat*.

Our limits will not allow of our entering into the various arguments for and against this popular theory. It is, however, a most important branch of physiology, and the student should make himself acquainted with the principal authorities on the subject.

ANATOMY OF THE ABDOMEN.

Of the Abdomen generally.

The abdomen, or cavity of the belly, is much the largest of the three great cavities of the body; forming, when its contents are removed, an extensive oval vault, bounded anteriorly by the diaphragm, posteriorly by the bones of the pelvis, superiorly by the vertebræ, laterally by the ribs, and inferiorly by the abdominal muscles. The superior part is called the back, the lateral parts are the sides, the posterior the loins, and the inferior portions throughout, the belly. These divisions being indeterminate and more proper to the exterior parts; others have been formed, in which the cavity is divided into what are termed *regions*, which it is necessary to beware of, as they are become arbitrary, and made use of in almost every description of these parts; and, as such, the veterinary surgeon should not only be well acquainted with every region, but with the particular viscera contained in each, which knowledge is very essential in his practice; as, in the event of a wound into the cavity, he can judge what viscus,

or viscera, is likely to be injured, and can give a more certain prognostic of the event, and more effectually combat the danger. The *regions* are three to the inferior part of this cavity, and one superior. The *epigastric region* extends from the cartilago ensiformis, or that part of the chest where rowels are usually placed, behind the elbow; to within four or five inches of the umbilicus, or navel: the lateral parts of this region are termed the *hypochondria*.

The *umbilical region* extends from four or five inches anteriorly, to the navel; and so much posteriorly to it; taking in the portion that two transverse lines in this direction would form: the two lateral parts of this are termed the *ilia*, or *flanks*. The *hypogastric region* extends from the posterior limit of the umbilical region, and forms laterally the *groins*: the middle part is called the pubis. The *lumbar region* takes in all the portion that is between the false ribs, and the bones of the pelvis; what viscera are contained in these regions will appear in the description.

The external parts of the abdomen are the common integuments, which do not differ from those of the rest of the body; the abdominal muscles, which we have described, the penis and testicles in the horse, and the bag and dugs in the mare. The internal parts may be reckoned the general covering, and the viscera, which are the *chylopoietic*, the *urinary*, and the *spermatic*, or organs of generation, with all their several appendages. The first class is by far the most extensive and numerous, comprehending the stomach, intestines, mesentery, liver, pancreas, spleen, thoracic duct, and omentum. The second takes in the kidneys, renal capsules, ureters, bladder, and urethra. The third comprises, in the male, the vasa deferentia, vesiculæ seminales, testicles, and penis. In the female, the vulva, vagina, uterus, and ovaria.

The *peritoneum*.—When the integuments and muscles of the abdomen are removed, then the general situation of the viscera appears: properly speaking, there are no viscera within the cavity of the peritoneum, but interstitial fluid only. The peritoneum is like a large membranous bag, or bladder shut up, the different viscera being pushed into its outer surface, encircled by it, and then fastened around; by which means they protrude within the bag like cavity, but do not enter it. When all the viscera are thus protruded, it will be evident, there will be no cavity left; but room only for the interstitial fluid to flow between each viscus, giving facility to their various motions. This bag, then so filled, would represent the peritoneum, which is firm, and of a pretty close texture, formed of a membranous lamen, with a considerable quantity of cellular tissue, placed on the outside of the bag, by which means the viscera have this adapted to their surfaces; while the inner cavity is left smooth and polished, and constantly moistened with a serous fluid secreted from its vessels. It is connected with the whole surface of the abdomen; it is likewise prolonged beyond the membranes in some places: there is, posteriorly, a prolongation that passes within the abdominal rings, investing the testes, and giving them their vaginal

coat. The peritoneum, at its posterior part, ends at the middle of the pelvis: that is, it does not proceed to its very bottom, being passed over on the anterior portion of the bladder, so that this organ cannot be said to be truly situated within the cavity of the abdomen. As the peritoneum passes over, it sends prolongations of the cellular portion to the posterior part of the pelvis; it likewise produces some few smaller elongations, forming sustaining ligaments to parts, as we shall describe; from all which, it is not difficult to understand the uses of this membranous expansion, which are to line the abdominal cavity, and to invest and sustain the viscera, and yet giving them a freedom of motion one over another. It derives its vessels and nerves from the surrounding parts, by which it has considerable vascularity, and is subject to partake in the inflammations of the neighbouring organs; but distinct inflammation of it I have never seen. It is wisely formed very elastic, which is evinced by the effects of pregnancy, of increased fat, and from dropsy: in all which cases it accommodates itself to the distention, and, on the removal of the distending cause, soon gains its original size.

The Omentum.

The *omentum*, or *caul*, is a double membrane, interspersed within, with little kernels of fat laying between two folds. This fat is not in such considerable quantities in the horse as in some animals; in whom the first thing that presents itself, on opening the body, is this membrane, spread over the whole intestines down to the pelvis; but, in the horse, the omentum is, as it were, folded round the stomach and anterior part of the intestines. (*Vide d, g, Plate* IV.) Thus the horse is not subject to the species of hernia, or rupture, termed epiplocele, which dogs and some other animals are liable to. The uses of this fatty membrane are not yet certainly known; it is most generally supposed to be for the purpose of lubricating the intestines, and to serve as a medium to prevent the effects of motion; and this opinion is much favoured by its appearance in many animals: but when viewed in the horse, and some other of the brute creation, whose quick movements would seem to require such an oily medium, it must be allowed that this cannot be its principal use; nor can it be intended altogether as a depôt for animal oil: for were it so, it would probably be as large in the horse as in the dog, who is equally an animal of speed.

The Stomach.

The *stomach* is so important an organ, that by the antients it was regarded as the seat of the soul, and its presence was considered by that great physiologist, Mr. Hunter, as the grand distinctive mark between animal and vegetable life; though we now know, that the existence of a stomach is not an invariable mark of the animal, nor does its absence incontrovertibly prove a vegetable origin. In the horse there is but one stomach, which is very small, proportional to his general bulk; and is partly membranous, partly cuticular, and

partly muscular; with a figure, that, when distended, has some resemblance to a bag-pipe. (*Vide d, Plate* IV.) It is situated immediately behind the diaphragm, in the left hypochondrium, and in part of the epigastrium, with its expelient orifice, extending across the spine to the right. It has two surfaces, which may be called its sides, though one is posterior, and the other anterior; and two extremities, a large and a small: the superior surface of which latter receives the œsophagus, and is called its *cardiac orifice;* while the former ends in the duodenum, and is termed its *pyloric orifice:* this extremity, when the stomach is distended, is the most posterior of the two. The hollow part situated superiorly, and rather anteriorly, forms its *lesser curvature,* as the lower and more posterior portion forms its *great curvature.*

Thus, when the stomach is moderately distended, it lies in an obliquely transverse direction, with its great extremity a little forwards, and its two orifices superior, but the cardiac the most so; having the lesser extremity rather posterior to the other, and the great curvature inferior, and perhaps a little posterior. It is evident, that its situation must vary much according to its distention: the foregoing description answers to it when moderately filled only; but when it is very much so, the left extremity will press upon the diaphragm, and the right will be carried more posteriorly. In oxen and sheep, where the first stomach is large, it is found, when much distended, to have its left extremity carried quite into the left iliac region, in which part it is usually punctured when they are hoved; but such an idea of the stomach of the horse would prove very erroneous; for this animal has a very small one, and therefore its situation can never be such. In dogs, though the stomach is not very large, yet it is in them also situated, when distended, more longitudinally, to accommodate itself to the contracted form of the abdomen. From a distended stomach's pressing upon the diaphragm, we are at no loss to understand why breathing is impeded after a full meal; or why a horse, in such cases, appears to labour for breath if quickly moved; for he is forced to use the intercostal muscles, the muscles of the shoulder, and those of the fore extremities, to open the chest; its distention backward being prevented by the pressure of the stomach upon the diaphragm: hence we see the great impropriety of galloping horses after watering, to warm it in their bellies, as it is foolishly termed; and also how hurtful it is to ride hard immediately after a horse has been full fed.

The stomach has externally a covering from the peritoneum, which adheres closely to it, by means of its cellular portion; and which appears to dip in between the muscular fibres. Its middle part is made up of muscular fibres, which are more numerous in this animal than in the ruminant; forming this kind into a medium between the membranous stomach of some animals, and the true muscular one of others. The direction of these fibres is various; but they may principally be referred to a longitudinal and a transverse order, though neither of them are regularly so, and are intermixed with others,

whose direction is very oblique. The longitudinal plan is the most external (*vide c c, Plate* V), and appears a continuation of the outer one of the œsophagus, with some original fibres, which spread over the lesser curvature, carry themselves obliquely around, and likewise over the great extremity, forming themselves into a kind of vortex, whose centre is in the middle of that extremity. The inner plan is by much the largest, and is not quite circular, but slightly oblique, crossing the obliquity of the longitudinal plan: the circular is very thick and strong around the cardia, or that extremity into which the œsophagus terminates; being here so very massive, as to form a true sphincter; and to this cause in a great measure may be ascribed the incapability of the horse to vomit: for should the circular and longitudinal fibres act from the pylorus to the cardia by any irritation that might produce an effort to vomit, the circular and longitudinal fibres of the cardia being infinitely stronger and more numerous, would shut this orifice: for as muscular fibres exist throughout the organ, by which the motions are effected; so it cannot arise simply from the existence of the cuticular covering to the first portion of his stomach, that he cannot vomit; as it is but reasonable to suppose the fibres act throughout the whole by the common consent of parts; nor do they of actual necessity want an immediate stimulus to their surfaces: for were such the case, the fibres of the œsophagus would not, by the presence of the masticated bolus, be stimulated to contract through the cuticular coat, which equally here lies over the fibres: nevertheless, the cuticular coat of the stomach is probably an assistant in this difficulty to regurgitate, by lessening the liability to nausea, which seldom takes place in the horse; and as vomiting is only an effort to remove nausea, or its cause; so nature not having given the disease, has not provided the means for its removal: for though, as we have often before hinted, she will be always found naturally equal to her wants, yet she will never be found to be superfluous, or to exceed them. As likewise vomiting appears to arise from an inversion of the peristaltic motion of the stomach, which motion, in its natural state, begins from the cardia, and ends at the pylorus; so, in this reversed state, it commences at the pylorus, and ends at the cardia, thus regurgitating its contents. Therefore it is very probable, that the cuticular covering may lessen this inverted peristaltic motion in the upper portion, though it cannot wholly destroy it; and hence this cannot be the only, or even the principal reason of the impossibility, or rather of the difficulty, with which this animal vomits; for instances have occurred where it has taken place. A horse in Sussex was seen to regurgitate a large quantity of grains, and I have heard of one or two other instances; but which must be regarded as very rare occurrences.

It is not, therefore, that the stomach of the horse cannot be irritated to make an attempt to vomit, that no such effect generally takes place; for though it is but very seldom that nausea occurs, and perhaps in a state of nature never; yet it may be excited by means of aconitum, hellebore, and some other substances, which

have caused fruitless efforts to bring up. But the true and principal reason that a horse may be said, naturally, not to be able to vomit, exists in nature herself, who has wisely so constructed the parts, that the very effort to it increases the resistance, by the very strong sphincter placed at the mouth of the cardia. How much thicker and stronger these are than the fibres composing the other parts of the stomach, may be gained on a reference to *Plate* V, which, as it was taken from the real subject, may serve to convey a just idea of their strength.

The inner covering of the stomach is composed of two portions, a cuticular and a villous. This species of *cuticular* covering to nearly one half of the stomach, is peculiar to such animals as appear destined to live on grain, as horses, asses, rats, and mice; and this forms a third species of stomach, between the true membranous one of graminivorous animals, and the muscular of the carnivorous tribes. It may also be considered in a slight measure as a species of gizzard, resembling in this degree the digestive organ of those animals, as fowls, who have a speciality to make up for the want of teeth. For a horse has not the means of remastication, as in oxen or sheep, nor does he usually masticate his food at first sufficiently to comminute it: the wants of the constitution requiring in him a quick renovation, he devours his food greedily and hastily: if, therefore, he had not some other structure, than the one common to stomachs in general, his food would not be sufficiently digested; particularly as much of his nutriment is solid, and the stomach small: and this cuticular coat, it would appear, is formed for this purpose, as its insensibility allows it to press in a small degree upon the food, and perform a slight trituration on it. This insensible tunic is spread over the first portion of the stomach, taking in all the great extremity, and forming between a third, and a half of its extent. It is formed into folds at the cardia in the same manner as at the internal part of the œsophagus; but as soon as it has passed this orifice, these folds take an irregular direction, but are less than those formed on the villous surface. The cuticular coat ends abruptly in a kind of fringed edge, very distinct from the villous (*vide d*, *Plate* V); and upon which are frequently found many of the worms, termed bots, piercing it by their forked tails.

The *villous or sensible portion*, though it occupies more of the length of the stomach, yet, perhaps, in real extent extends over little more than half of its surface; it unites with, or is connected to the cuticular coat. Its external surface is firm, and appears, as it were, a distinct portion, but is nothing more than the general cellular membrane, here rather more dense, which has given rise to the description of four tunics to the stomach. The tunica villosa is so called from its resemblance to the pile of velvet; its fine villi are probably the extreme fine ends of vessels secreting the gastric juice: this coat being much larger in extent than the muscular, is thrown into folds, which are more considerable than those of the cuticular coat. (*Vide e*, *Plate* V.) These are largest at the portion

towards the great extremity, and are irregularly waving: towards the duodenum they become less; and at the pylorus, they form a fold that makes a kind of valve, to prevent the return of the food, as well as its too early exit. These folds not only hinder the too speedy passage of the food, and by which means the gastric juice is more certainly applied to all the parts; but the principal end appears to be to increase the secreting surface, which is here essentially necessary, seeing the horse's stomach is but the one half of it a secreting organ; and hence these folds are in him more extensive than those of the human. We here likewise see the utility of the saliva; for were the food to pass into the stomach dry, or nearly so, the gastric juice, being but a mucus, would not pervade all its parts, but would be lost upon some.

The vessels of the stomach are three very considerable branches, the two gastrics, and one from the pancreatic, which are ramified over its different portions, forming two considerable arches, one over the small, the other over the great extremity. (See *Arteries*.) The blood is returned by similar veins into the vena porta. (See *Veins*.) The nerves are derived from the par vagum, which are the eighth pair that arise from the brain, and, passing out of the skull, are continued on the outside of the carotids to gain the œsophagus, and proceed with it, uniting with the intercostal to furnish some branches to the thoracic viscera, and are then spent upon the stomach. It is probable some particular end is brought about by this peculiar origin of the nerves of the stomach; and it is more than probable that it is by this means, that it proves so greatly an organ of sympathy.

Digestion.

Digestion is one of the most important processes that goes on in the body; and is that wonderful power whereby substances received into it lose their own properties, and become endowed with those belonging to the constitution in which the assimilation is carried on: that this takes place within the stomach was always allowed, but in what manner, was till lately a matter of much debate. Heat, putrefaction, friction, and fermentation, have successively been considered as the principal agents in digestion. But Mr. Hunter first accurately described the process of solution, by the agency of the gastric fluid; and which theory the experiments of the Abbé Spallanzani and Reaumur have contributed to strengthen. It is now, therefore, universally considered that digestion is a process of solution, and is effected by means of a fluid secreted within the stomach, called the *gastric juice*.

The various actions of an animal body produce a waste of the fluids, and even of the solids, and something like a want of tone in the moving powers: these are indicated by the sensations of fatigue and hunger. To restore the tone of parts, rest is required; and to repair the waste, food becomes necessary. As an excitement to the taking in food at proper intervals, the horse is subjected to a sen-

sation, called hunger. *Hunger* does not arise from the attrition of the sides of the stomach against each other; nor does it arise from the action of the gastric juice upon the stomach; but appears to be brought on by the stomach sympathizing with the wants of the constitution: and hence it is, that food taken in invigorates, before it can be digested; and hence the propriety of giving but little food, and that frequently, when we travel quick, that we may not overrate the power of the stomach; and which caution is more particularly requisite in weak constitutioned horses. That this sympathy between the stomach and the body is great, we know, by the prostration of strength that is felt on an empty stomach; and which cannot arise from inanition only, but from sympathy also; for let a tired horse hear the hounds, and he will go on through a long chace with alacrity; but when the melody of the dogs is over, the attention is no longer engaged, and the sympathy returns. It is not improbable, that a sufficient degree of tension in the stomach is necessary to give it its proper energy, and without which it becomes painful; hence water, in which there is little nutriment, will give tone by distention, and prevent, for a time, the sensation of hunger.

Stimulated, therefore, by this sensation, animals are induced to take in such particular food as their organs are fitted to the assimilation of; and to which they are directed both by instinct and by taste. The carnivorous tribes are prone to take in flesh, by their love of it, and they have organs capable for the assimilation of it. The horse has a disposition to take in grain, for he has a mechanism calculated thereto: the ass, the rat, and the mouse likewise. The gastric juice is the powerful solvent, by which this assimilation is effected, but it appears not to possess any sensible chemical qualities: no acid or alkali has yet been discovered in it: it acts solely by a living power; and so far from its fermenting substances, it stops that process in some instances; and as it proves in others a powerful antiseptic, consequently it cannot produce its effects by putrefaction either. An acid, it is true, is found in the human stomach sometimes, but this is a diseased alteration of the gastric fluid, from a particular action of the vessels. It has a disposition to coagulate milk; but this does not arise from its acid, but is a peculiar property: the rennet used in making cheese is the digesting stomach of a calf. We have therefore every reason to suppose, that no chemical agency effects this process, but that it is truly a living one. Though the powers of this juice are great, yet life has a particular power to resist its action; hence bots, and other worms, are not, while living within the stomach, digested, but when dead, they become dissolved like other matter: it is in this way, that this juice has been found to operate upon even the stomach itself. The food, therefore, acted upon by the gastric juice, is reduced to a pultaceous mass, called chyme, and which is found streaked with a white fluid, which is the true *chyle*. In this state it passes into the intestines, but more quickly than in most other animals, that it may be hereafter acted upon. For the digestive

economy of the horse is different from that of most animals; and the process we have described in him is imperfectly carried on within the stomach, but matured and completed within the intestines. A horse, as an animal destined for great exertions, needs great support; hence he eats very largely: and as he likewise is designed for great speed, so the bulky viscera of the ox would have but ill accorded with his celerity in progression; hence he has but one stomach, and that a very small one. As, therefore, his exertions require that he should eat largely, and yet as his speed renders it necessary that his viscera should be compact; so some peculiarity, either in form or economy, might be expected; and which speciality consists in having the food taken in, but very slightly digested in the stomach: but this process begun here, is further carried on, and completed in the intestines. As, likewise, much food is necessary to be taken in, and yet the stomach is small; so it is evident, it can remain in it but a very small time: a horse will eat two or three pecks of corn, but his stomach will not hold half of this; and he will frequently drink two, or even three pails of water, but his stomach will hold not one. As vegetable matter, of a given bulk, affords less nutrition to animals, than so much animal matter; and as we have shewn, that the exertions of the horse require that he should have great support; and as the effect of vegetable food is not lasting on the constitution; so a horse not only eats largely, but he eats frequently. A dog fed once a-day will thrive; but a horse so fed would starve: even oxen and sheep can bear fasting, without prejudice, much longer than a horse. The stomach is an organ of strong sympathy: we have shewn that it produces the sensation, termed hunger, by sympathizing with the wants of the constitution; and as the economy of the animal demands that food should remain in his stomach but a little time, so it requires that it should be frequently replenished. We have likewise shewn, that it is probable some degree of distention is necessary to the well-being of this organ, and that not only the stomach sympathizes with the wants of the constitution, but likewise the constitution sometimes sympathizes with the stomach; that is, that when entirely empty, it produces a peculiar prostration of strength, independent, in some measure, of the want of nutrition to the constitution; but dependent, in a degree, on the absence of its own tension: this is exemplified by a draught of water invigorating, in which there can be but little comparative nutriment. From all this, therefore, it is evident, that the process of digestion in this animal is in some degree a peculiar one; and whereas, in most other animals, it is principally carried on in the stomach, in the horse it appears equally promoted in the intestines, having previously absorbed into the pultaceous mass, the gastric juice; which is here also, as in all other animals, an active agent in solution. The stomach partakes of the peristaltic motion, not equally throughout its whole length, but most in that part below the cuticular portion: it acts in being gently constringed, and it appears also to have another action, by

means of its longitudinal fibres, by which it becomes shortened, and must throw out that portion of the chyme that is next the pylorus, which must also be the most acted upon: it is probable, likewise, that the left portion may act by gentle constriction, producing a slight species of trituration in that part upon the contained grain, which may produce a further maceration, or at least more intimately blend, and fit it for the action of the gastric juice.

In the horse, the stomach is not such a general organ of sympathy as in man and some other animals; in the human, on the contrary, it sympathizes largely with the constitution. In illness it seldom feels hunger in us; and in most diseases it is nauseated. The mind influences it likewise: the effects of bad news, unpleasant sights, &c., on the stomach, are universally known, and every day met with. In the horse this is by no means so evident: nevertheless, there are some sympathetic effects observed between this organ and the constitution: it has the sympathy of hunger in common with other animals: in illness, the appetite is lost, though usually not in so great a degree as in the human. Under fatigue, cordials, as strong beer, invigorate, which can only be by the sympathy produced. Tonic medicines probably act by sympathy, for we are not aware that several of these substances enter the blood vessels. Another instance of sympathy exists in mares when under the effects of oestrum, that is, when they are horsing, they will seldom eat well. The stomach has sometimes also a diseased sympathy, for sick horses will often eat, and die with the food in their mouths.

From the horse not being subject to nausea, we thereby lose many effects that we can produce on the constitution of man, and other animals, by exciting it. It is by raising nausea, that we act powerfully on the absorbents: by it, we can likewise relieve the intestines, but in a horse nothing appears to nauseate, unless it inflames the stomach; and, in consequence of its large portion of cuticular coat, it will bear very considerable quantities of many substances, that prove poisonous to other animals: in short, it would appear, from various experiments, that those medicines that produce their effects, by raising the sympathizing properties of the stomach in other cases, in the horse prove nearly inert; for very little of such an effect takes place, which may be attributed not only to its large portion of cuticular part, but likewise to a particular want of irritability, even in the vascular part.

Description of Plate V.

This plate represents the stomach and intestines taken out of the body, and laid without any particular order. The stomach is cut open to shew its inner surface, and the cuticular coat.

a, the cardia, or recipient orifice, with the œsophagus cut off; *b b*, the circular plan of fibres, which at this part are very much increased, to give great force to

the cardia, and prevent the possibility of vomiting. This plan is seen lessening in force as it approaches the large extremity of the stomach; therefore, it must have a peculiar office at this part; which, as it cannot be to prevent any thing entering, so it must be to prevent any thing escaping; *c c*, the longitudinal plan; *d*, the inner part of the great extremity of the stomach, covered internally with the cuticle; hence this is called its insensible part: its rugæ, or folds, which are small, are shewn on this surface; *e*, the membranous portion of the stomach, which is its vascular and sensible part: its folds are seen larger than those of the other portion; *f*, the external part of the great extremity; *g*, the pylorus, or pyloric extremity of the stomach, with a species of duplication of its membrane, forming a kind of valve to prevent the too hasty passage of food through it; *h*, the duodenum, or first small gut continued from the stomach, with the biliary and pancreatic ducts entering it; *i*, the mesentery; *k*, the small intestines ending in the cæcum; *l*, the cæcum, with its blind end shewn; *m*, the commencement of the colon by a contracted portion; *n n*, the continuation of the colon, with its membranous bands, and its sides thrown into cells; *o*, the termination of the colon into the rectum.

The Intestines.

The remainder of the alimentary canal is continued from the expellent orifice of the stomach, to the anus, or end of the passage; forming a long canal of different dimensions, called *intestines*, which are usually divided into small and large. In some animals, and in the human, they hardly merit this distinction, there being but little difference in point of size; but in the horse, the disproportion is very considerable; the small intestines being not much larger than the human, but the large of an immense bulk. This canal is connected through its whole extent to membranous productions of the peritoneum, but principally to those called mesentery and meso-colon: it varies in point of length in different subjects, but is seldom less than twenty-four yards, and often more. The intestines are contained within a prolongation of the peritoneum, the two lamen of which membrane separate and surround their bodies; and this forms their external coat. The next is muscular, and formed of two plans of fibres, a longitudinal and a circular; by the contraction of which, the vermicular motion, called *peristaltic*, is performed, the longitudinal slightly shortening them, and the circular diminishing their size. Within this muscular tunic there is a quantity of dense cellular tissue, which was formerly considered as the nervous coat, but which is known now to be only a layer of cellular membrane. The inner tunic of the intestinal track is the villous, which is a very vascular and sensible one, but is furnished with no valvulæ conniventes; at least there are no considerable folds of this inner coat as in the human: they were in this animal rendered unnecessary by the great length of these organs, and the consequent slow passage of the aliments through them by this length and by their position. The *division* of the intestines into large and small in the horse is self-evident; and each of these gain other separations, but which are not so well marked. The *small* are divided in duodenum, jejunum, and ilium; the *large* into cæcum, colon, and rectum. (*Vide Plate* V.)

The *duodenum* is attached to the stomach, whose pyloric orifice ends in it; its course in the horse is rather different from its track in the human; and by which it gains rather a more complete covering from the peritoneum. It hangs loose and pendulous, being attached to the concave surface of the liver; here making a turn, it becomes fixed to the vertebræ, and then takes the name of jejunum; but as in this course its length is nearer twenty inches than twelve, it is evident that duodenum is an improper term for it, in the horse. It appears rather larger in circumference than the other small intestines, and is remarkable for having the pancreatic and biliary ducts obliquely penetrating it; sometimes entering it close together, at others at some distance from each other. (*Vide h, Plate* V.)

The *jejunum* gains its name from being commonly found empty, and is attached to the mesentery, which follows its circumvolutions; the line of division between it and the ilium is only imaginary: it is usual to consider rather more than a third of the joint length to belong to this intestine, and something less than two-thirds to the next.

The *ilium* occupies the portion we have described within the iliac region, from whence it derives its name; it presents no peculiarities of structure; but, equally with the former, its circumvolutions are all connected by the windings of the folds of the mesentery. The extremity that penetrates the cæcum by a protrusion of its inner surface forms an incomplete valve, which in some measure prevents the return of the fœces into the smaller intestines.

The *large intestines* have but little resemblance to those of the human, and may, with propriety, be termed large in this animal. The *cæcum:* The ilium ends in the posterior part of the abdomen in a very large canal, which it enters abruptly: the anterior portion of the canal projects forward two or three feet into a kind of bag of the size of the colon (see *l, Plate* V), which terminates in a blind end; and this forms the *cæcum:* the posterior portion beyond the insertion of the cæcum, forms a smaller blind end (see *Plate*); therefore the ilium may be regarded as entering the cæcum only. This gut usually occupies the right side of the abdomen, and appears immediately on opening the peritoneum; commencing from the colon and ilium in the right iliac region, it extends forwards to the right side, with its pocket-like part applied towards the diaphragm and liver near the xiphoid cartilage. This termination is not furnished, as in some animals and the human, with an *appendix vermiformis;* but terminates, as we have said, by a simple blind end. Through the peritoneal covering, we observe four muscular longitudinal bands, extending from the extremity along the muscular tunic; and which divide the gut into four portions. One or two of these are usually covered with fat, and are not so regularly longitudinal as the others (see *Plate*). The internal membrane is plaited up, as it were, between these fræna, and by these intersections are formed numerous cavities called the cells.

Upon the slightest inspection there appears a very great peculiarity in the formation of the cæcum in the horse; and, on a more attentive view, we are struck with its evident importance in this animal; and are led to consider it as little less than a second stomach, and which in fact is the case: for the food, or, more properly, the macerated mass of the small intestines mixed with the biliary and pancreatic juices, here undergoes some further change; and, for this purpose, the cæcum has clearly a structure, favourable to its detention within it, and to the circulation of this mass throughout all its parts. It has two blind ends, one of which forms its basis, and near to which enters the ilium; the other forms its apex, and extends up towards the diaphragm. From one part of the base the colon commences, but it commences by a very contracted portion (*vide m*, *Plate* V), and this contraction, it is evident, is for the purpose of preventing the entrance of the contents of the ilium into it until they have passed through the cæcum. In many animals the cæcum is a very inconsiderable part; in some it has one or more appendicles, in others it is almost entirely wanting; and, in all but the horse, its use is obscure, and apparently not very important; but in him, as before noticed, it is certainly little less than a second stomach, for its whole structure evinces that it is purposely designed that all the food taken in must be poured into its basis, by the contraction of which it shall be forced towards the apex; and either in its passage or return be detained in the cells to be in some way farther acted upon, and to sustain some change necessary to the system. Having undergone this change, whatever it is; by the farther contraction of the cæcum, it is forced into the colon.

The *colon* commences small, but as it originates from the side of the base of the cæcum, and as the ilium cannot be said to jointly enter it with the cæcum, as in some other subjects, so there is here no such part as the valve of the colon properly: but, instead, the ilium presents a kind of protrusion of its inner membrane, by which it may in some measure prevent the return of the matter of the cæcum within it. The colon is small at its origin, and, as it passes, it experiences a still further contraction; it then enlarges into a very capacious and long canal, which, having made nearly the circumference of the abdomen, again forms a second but slighter contraction: after which it once more enlarges, and again passes around the abdomen; when lessening a third time it ends in the rectum. Upon these circumvolutions, as well as upon the cæcum, the small intestines lay. In its turns it has some membranous connexions by which its too great displacement is prevented; it is likewise furnished with four ligamentous bands in its large portion, but which are reduced to two only in the smaller parts; these form longitudinal fræna, which being intersected again by internal plaits, produce the cells of this gut. It is connected and sustained in its situation by that portion of the mesentery termed

mesocolon. The colon and cæcum are the principal sufferers in those inflammations that arise from violent purging medicines.

The *rectum* is the continuation of the colon, and passes backwards from the lumbar vertebræ to the anus. Its muscular coat is thicker than that of the other intestines, and it is thrown internally into cavities by the inner membrane, in some manner similar to the cells of the colon, though less: were it not for this interruption, the intestines might be too frequently stimulated to expel their contents. The rectum is attached to the spine and sacrum by a detachment of the peritoneum, which is here, therefore, called mesorectum: but the true lamen of peritoneum does not invest its whole portion, but leaves it as it approaches the gut, which is at this part only covered with the cellular portion of it. The ligamentary bands of this intestine are very strong, and end at the anus in an expansion attached to the coccygis. The *anus* is the termination of the intestinal canal, and is opened by the force of the peristaltic motion, and the consent of parts, and is shut by a muscular band around the extremity of the gut, called the sphincter. It is likewise elevated and retracted by two pair of muscles.

The *mesentery* (*vide Plate* V).—This great folded membrane is a prolongation of the peritoneum in which the intestines are, as it were, laid, and pushed inwards into the great bag of its extent, as we have before described; and as it passes round them, and meets at their superior part, the lamen unite and form a single membrane, which is called the *mesentery;* and is of different lengths, as the intestines are protruded farther or less within the great bag. These peritoneal prolongations are very useful, for they not only invest the intestines, and give them their outer covering; but they attach them likewise within their situations; and they are, further, the medium through which they receive their blood vessels and nerves: and, moreover, they are the vehicle for the conveyance of the chyle by means of the lacteals, which are situated and sustained within these membranous folds. The origin of the mesentery from the spine is of small extent, but it is so framed, that as it proceeds it is enabled to follow the whole of the intestines through their course, branching out like a fan, from its beginning at the duodenum to its termination at the rectum. All that portion of it that sustains the small intestines, is called the *mesentery;* that which is attached to the colon, and whose extent is longer, has the name of *mesocolon;* and *mesorectum* is the term given to that more inconsiderable portion which attaches the rectum. Within its laminæ is contained in some instances a considerable quantity of adeps, which is greater or less, according as the animal is more or less fat in general. The *anterior mesenteric artery* arises from the aorta near the emulgents, in a considerable trunk, and soon divides into a number of branches, which pass between these laminæ of the mesentery, forming communications with each other, and then are distributed in a beautiful network around the small intestines principally. The

posterior mesenteric artery arises behind, in a very considerable trunk, and is principally distributed to the great intestines, which however receive some large branches from the anterior. There is likewise a small branch by which the duodenum is supplied before it becomes attached by the mesentery, which is called duodenalis. The *nerves of the intestines* are principally from the anterior mesenteric plexus which furnishes the small bowels; and the posterior mesenteric plexus gives branches to the large; with some filaments furnished to the duodenum from the stomachic plexus, and to the rectum from a plexus within the pelvis. *Mesenteric glands:* These are the conglobate bodies we have described in treating of the lymphatic system; situated between the lamen of the mesentery, and with whose structure we are not much acquainted, but whose use we know is connected with the lacteals; for we always find those vessels run through them; and when they are schirrous the same vessels become obstructed. These glands now and then, though but seldom, become affected in the horse. I have found them frequently so in virulent glanders: in monkies, diseased mesenteries are a very common cause of death; and infants of the human species are very obnoxious to the same complaint.

The *lacteals* are the vessels we have already treated of in the lymphatic system, differing from the lymphatics only by the fluid they carry, and arising from the villi of the inner coat of the intestines throughout their whole extent, in the horse, as well from the large as the small intestines; and from whence they take up the chyle from their surfaces, and carry it in small trunks towards the conglobate mesenteric glands: these vessels, in this first space, are called *venæ lacteæ primi generis;* and from which glands they come out on the opposite side, in larger and fewer trunks, when they are called *venæ lacteæ secundi generis,* proceeding to penetrate other glands in the same way, till they at last reach the receptaculum chyli, and deposit their chyle, as has been described. (See *Lymphatics.*)

Uses of the Intestines.

The long tract of canal we have described, appears to be intended to receive the pulpy mass of the chyme, after it has undergone some alteration, and some solution of its nutritious part, but the whole continues to be carried with the general mass that passes out of the stomach by its gentle propelling motion: as the chyme enters the duodenum, it becomes mixed with two fluids, the pancreatic and the biliary, by which some fresh changes probably take place in it; here the chyle appears to be rendered complete and fitted for absorption. The intestines throughout continue the creeping action we have noticed, called the *peristaltic motion,* and which is brought about by the two orders of muscular fibres; the longitudinal straightening the convolutions, and steadying them; while the circular, in its progressive contraction, presses the contents onwards, not by continued but by gentle efforts, renewed after the

lapse of a short time. Nature has provided against the too great effects of this motion in the most careful manner, and has in every instance given such a formation as to encourage the stay of the chyme within the intestines, till the whole of its nutritive parts may be taken up. Hence, in animals who feed upon vegetables, she has given an immensely long alimentary track; because, as in this kind of food there exists but a small quantity of nutritious matter in a large bulk, so it is necessary, that much should be taken in, and retained for a long time to be fully acted upon. Thus in the ox, though his colon is not so capacious as that of the horse, yet his cæcum is much larger; therefore, the detention is equally brought about, and this demonstrates the principal use of this gut, about which anatomists differ so much: add to which, that the intestines generally, in the ox, are much larger than in the horse; for common herbage, containing less nutritious molecule than grain, so it was requisite he should have organs fitted for a more minute comminution of it, and which is done in four stomachs; in him, therefore, the fæces are expelled in a state of perfect solution, and having few nutritious parts remaining, from which arises the known inferiority of ox and cow dung for agricultural purposes. In the horse, as grain affords, though more than grass, yet much fewer nutritious particles (or perhaps possesses the aptitude to be acted upon in a less degree) than flesh; so he is furnished with a longer and larger alimentary track than carnivorous animals, that the quantity taken in might be considerable, but more particularly, that the chyme might be long within it.

Thus, therefore, the chymous mass mixed with the pancreatic juice and the bile, and having undergone certain changes by the commixture, is gently propelled along the intestines, where it applies itself to the surfaces of the villi, which are the orifices of the lacteals, when the chyle becomes separated, and, by a particular stimulus or sympathy, is received within them, and carried forward to the chylous receptacle, to be passed, through the means of the thoracic duct, into either the jugular or axillary vein; whereby it becomes mixed with, and converted into blood, producing that increase to the *quantity* we have mentioned; as the alteration from the air received by the lungs, is that melioration of its *quality*, which we, at the same time, shewed was necessary.

The process of digestion is so important, that the veterinarian cannot pay too much attention to it; whether considered in an anatomical, physiological, or in a practical point of view. I shall not, therefore, be considered as trespassing too much on my limits, by the following recapitulation and summary. In treating of digestion within the stomach, we shewed that the process as carried on there, was not conducted altogether in a similar manner in the horse as in the human, but that the pulpy mass was in the former more hastily passed through it; consequently it became necessary that more should be done to complete it in the intestines, than was supposed to be done by the human intestines: and, accordingly, we

have pointed out that the continuation of the horse's alimentary track presents varieties in structure evidently for the purpose of completing this but half-finished process. We have also already given our sentiments on the cause of the peculiarity of the horse's stomach; it is only necessary now to repeat, that whether nature intended, or framed the horse for our immediate use, or for his own, or both; she has so formed him, as to make him possess at once the united properties of great bulk, great strength, and great speed. To support his great speed, he must have great strength; and, at the same time, to give him this, and yet not to render him heavy and clumsy, he must have peculiar food, and peculiar powers of assimilation. The first he derives from grain, which there is little reason to doubt was intended by nature to be the food of the animal; and the second, he draws from the varieties in his structure.

In the human, and many quadrupeds, the process of digestion is completed in the stomach and first intestines; hence in these there are valvulæ conniventes, to prevent the too hasty passage of the food through them; and it is in these only, that the principal absorption of chyle takes place; the remaining intestines being but little larger than the former, with the disposition to detention in them not so well marked. But in the horse, though in the small intestines the mass receives the bile and pancreatic juices; and though it here probably receives additional moisture from some secretion from the intestines themselves; which we gain by considering their great vascularity, which is infinitely more than sufficient to their simple support: and, likewise, that though some of the chyle may be absorbed here, yet, in these, there exists evidently no apparatus purposely to detain the mass, as in some animals; for here are no valvulæ conniventes, but the chyme is permitted to pass speedily and without interruption into the large intestines, where the process of digestion and separation is still farther carried on and completed. The large intestines we have shewn are in the horse very capacious; they are likewise very vascular; by which some secretion must be carried on within, and which is probably an essential, or an auxiliary to digestion. These larger bowels are likewise so constructed as to be enabled to detain the food a long time within them, by means of their frenæ, which are a species of valvulæ conniventes; and by which they form themselves into cells evidently intended to keep the mass within them, till it can be completely acted upon by its stay. Not only does this speciality of structure evince the use of these intestines; but their being peculiarly supplied with numerous lacteals, which, in the human, and carnivorous quadrupeds, are found principally in the small intestines, is a further proof. It only remains to add, that the mass having all its nutritious particles separated from it, becomes now truly fæcal, or is properly dung; and as it becomes moulded and dried in the cells of the large intestines, by the great absorption going on from them, it is propelled into the rectum, and from whence it passes out at the anus.

When therefore we consider the length of the intestinal track, its peculiar structure, together with the horizontal position of the animal, we are at no loss to account for the difficulty with which we produce purging in the horse. It is not only difficult to produce it in point of time, but even in effect also; and hence it is a process of great exertion to the animal, and as such, occasions great exhaustion; and as these parts are very vascular and irritable, so improper doses of physic very frequently prove fatal. Nor is the irritability of the intestines the same at all times, which is the reason that the same medicine that will purge at one time, at another proves inert. It appears likewise, that the irritability of the horse's intestines differs from that of the human; at least, substances that stimulate the one have no effect on the other: thus, a pound of jalap will not purge a horse, though twenty grains are a brisk cathartic to a man or a dog. Purging, it may also be learned, is nothing more than an increase of that natural action of the intestines, by which they expel their contents, called the peristaltic motion; and which appears brought on, and kept up, by the irritability of the organs; this irritability is such, as to remain in them for some time after they are out of the body.

The intestines have various stimuli; air proves a strong one to them, as we know by its effects: the food is a stimulus to them, but not a sufficient one probably; hence nature has given another, which she pours out when wanted, which is the bile: when this natural purge is wanting, obstinate costiveness ensues; and, also, when it becomes increased in quantity, or vitiated in quality, diarrhœa takes place. The internal surface of these organs may be stimulated, as we have mentioned, to an inordinate degree of contraction by purges, in which case they expel their contents without absorbing the more liquid parts: thus, horses who easily purge, seldom fatten; and, hence we see the propriety of permitting the intestines to empty themselves by mashes before we give physic; for, otherwise, the smaller ones may be stimulated to contract too speedily for those behind to remove the mass, and hence distention and inflammation may arise; and this the more easily in the horse, from his prone situation. Pressure is also an intestinal stimulus, as we find by the action of the abdominal, and other muscles, in exercise, which causes a speedy evacuation of their contents; and, for the same reason, horses with small carcases are easily purged on exercise. We learn also from these considerations, that it is proper to let digestion proceed some length when baiting on a journey before we move the horse, or his chyme will be propelled before the chyle can be taken up; and thus he will reap only the benefit of a cordial, which, as it acts by sympathy, is merely temporary; but the permanent benefit resulting from an increase of blood, will be wanting; and hence it is, that horses flag under injudicious management, who, under a different treatment, would continue strong and equal to what is required of them.

The Liver.

The *liver* is a large mass, situated in the right, with a smaller portion, in the left hypochondrium, and in the epigastrium (see *b b, Plate* IV); with its convex surface adapted to the convexity of the diaphragm, and its concave applied to other abdominal viscera. It is of a dark red colour, and two feet, or two feet and a half in circumference, being thick towards the middle, but thin at the edges; in the horse divided into several portions, seldom less than seven or eight, forming two large lobes, and several smaller ones; the same is observed to be the case in all animals destined for quick motion. These lobes produce inequalities on its concave surface, and notches in its edges likewise, some of which are deeper than others, and which are called its *scissures*. It has several considerable depressions on the concave side; one is formed by the right kidney, the anterior part of which is received into a depression of a small division or lobule of the great right lobe: another considerable depression, called its *great scissure*, divides the two larger lobes from each other: a third appears near the termination of this greater one, in the middle of the concave surface, and is called the porta of the liver, into which the sinus of the vena portæ enters. The remains of the umbilical vein likewise form a considerable cavity within the great *scissure:* the vena cava and œsophagus also form depressions in their passage at its superior part. The liver is attached at its convex surface to the diaphragm, by productions of the peritoneum (see *Plate* IV), and likewise by means of cellular membrane; the vena cava serves also to attach it: by all of which it is sufficiently retained in its situation, and is farther assisted by the pressure of the viscera. It is exteriorly covered by the peritoneum, and internally within this there is a considerable layer of cellular tissue that penetrates its substance, and which is furnished with numerous lymphatic vessels accompanying its several portions. The substance of this organ is composed of an immense number of granulated corpuscles, apparently formed from the several vessels entering it, and which are in some way connected with the secretion of the bile. The vascular rami entering the portæ of the liver, have a cellular investment discovered by Glisson, and hence called Glisson's capsule: it enters with the trunks, and serves as a connecting substance to the internal structure. The blood vessels are the venæ portæ, vena hepatica, and the arteria hepatica.

Vena portæ hepaticæ.—We have before described the veins of the abdominal viscera, as returning their blood into the sinus of the vena portæ, which may be regarded as the termination of that portion, called *vena portæ ventralis*, and the beginning of that termed *vena portæ hepaticæ;* from whence it is branched off in every direction to be ramified throughout the substance of the liver: therefore, at this origin in the sinus, the vena portæ hepaticæ takes up the office of an artery. *Hepatic veins:* When the blood carried into the substance of this viscus, and dispersed throughout these cor-

puscles, has been acted upon, and the bile formed from it; it is collected from the ramifications of the *hepatic veins*, which are the true venal trunks of the liver: these unite into several rami, and pour their blood into the cava by very numerous branches. The *hepatic artery* is a branch arising from the aorta, which, though it furnishes so great a viscus, is yet much smaller than either of the emulgents: it is, therefore, evident, that it can take no part in the secretory office of this gland: but as its own life must be kept up equally with that of other parts, and which life is entirely distinct from its specific action; so it must have arterial ramifications, and which are furnished throughout its substance by this means.

Pori biliarii, and *hepatic duct*.—In the glandular corpuscles some great change goes on, by which a fluid substance is separated from the venal blood. These biliary pores appear to end in small tubes, which gradually form others, following the course and the divisions of the vena portæ, till they all unite to form one duct, which is the *ductus hepaticus*. In the human, and all other animals that we are acquainted with, except the horse, ass, and deer, there is another trunk, or duct, called ductus cysticus, which arises from the hepatic, and terminates in a considerable membranous bag, called the gall bladder, by which some of the bile regurgitates from the hepatic canal to be lodged in the gall bladder, where it becomes thicker, more acrid, and bitter: but, in the horse, the hepatic duct is continued from its origin at the centre of the concave portion of the liver, to its termination within the duodenum, a few inches from the pylorus, in company with, or not far distant from, the pancreatic duct. The nerves of the liver originate from a plexus formed of some filaments of the par vagum and the sympathetic; and as these are but few in proportion to its bulk, so it is a viscus of little sensibility, and even under inflammation the pain experienced is rather dull than acute; from its more simple structure also with regard to its ducts, it is in the horse but little subject to disease. But though, in this animal, it seldom becomes primarily affected, yet it is not unfrequent that it partakes of the affections of the neighbouring viscera, and in these cases is found after death in a gangrenous state. In some instances also, a more slow inflammation or obstruction of its ducts takes place, when the horse becomes universally yellow throughout his skin.

Uses of the Liver.

In most animals the liver is found more evolved at birth than any other organ; the reason of which appears to be, that it receives more blood than other parts; for not only does all the blood of the chylopoietic viscera pass through it, but that from the umbilical vein likewise. In man, and in every other animal with which we are acquainted, there is an apparatus purposely to prevent the meliorated and vivified blood of the umbilical vein from passing through the liver, which is brought about by a communication between this venous trunk and one of the hepatic branches of the

cava, and which communication is called *canalis venosus;* but in the horse and his counterpart, the ass, no such communication exists, but the whole blood of the umbilical vein passes through the liver.

It is impossible not to admire the wisdom displayed in the structure of these various parts, and the contrivances to produce these certain ends. In the fœtal state, the glands and other organs have no specific action to perform, or, at least, but little more than evolution or growth; hence there is no necessity for blood more pure than is merely wanted for the support, and for this evolution: were the blood more pure, the specific action might commence; and therefore nature exhibits some admirable contrivances purposely to deteriorate it, and to render it less pure, that the various organs might be held only in a state of capacity. The placenta forms the true fœtal lungs, and the blood circulating through the umbilical arteries, is dark and venous, but becomes altered by the action of the maternal portion of the placenta, so that, as it returns by the umbilical vein, it has become vivified and oxygenated; but it is evident, it can only be so in a subordinate degree, seeing it receives its principles through a secondary medium; therefore the whole blood that the fœtus receives is less pure than that of an adult, and thus the organs are not stimulated to their specific action; but employ all the oxygen or vivifying principle, contained in this but half pure blood, for the purposes of evolution. But as the liver is an organ that secretes its fluid, the bile, from venous blood; so, unless there were some speciality in its structure in the fœtal state, the specific action might take place; and accordingly we do find that a peculiar contrivance is formed for this purpose, for, in the fœtal colt the liver receives purer blood than any other part, by means of the umbilical vein carrying its contents into it; in the horse wholly, and in all other animals sufficiently, to prevent the specific action. What may be the immediate reason that the whole of the blood circulates through the liver in the horse, and that he is destitute of a canalis venosus, we are not aware of; but it is probably in some manner connected with the peculiarity in the structure of this organ, as being deprived of a gall bladder.

The liver therefore, like the other organs, displays a wonderful contrivance, that the regulation of the economy shall be complete, and the whole system in the fœtal state evolved; but though evolved not active: on the contrary, the organs exist in a state of capacity only. When, after birth, there is no longer any necessity for these contrivances, but, instead, a necessity even exists for their removal, it is effected by the common consent of parts: and now the liver receives venal blood only, and from which, by the living power of the part, it is enabled to secrete a fluid, that proves of the utmost importance to the system, being the stimulus whereby the intestines are impelled into motion; and perhaps it may likewise perform some chemical change on the chyle with which it mixes in its passage through the duodenum.

The *bile* appears composed of mucilage, resinous substance, and mineral alkali; and is between a yellow and green in its colour, and of a bitter pungent taste. In the horse it is probably constantly flowing, except at the slight intervals when the peristaltic motion presses the sides of the duct; hence it is that these animals are less liable to obstructions of this fluid from calcular concretions than most others. This regularity in its distribution was necessary in the horse, who is so frequently eating; for being an animal designed for speed and great exertions, he could not conveniently be made bulky and with equally capacious digestive organs, as the ox: but to compensate, he takes food frequently, which must be as frequently digested and expelled; hence the reason of this formation becomes evident, for in him the same kind of purge being at all times required, it is constantly and regularly poured in, seeing he is almost always eating; but in the human, as the bile is uniformly secreting, but not constantly wanted, so there is a reservoir containing one kind, very acrid and stimulating, and another, mild and more slightly purgative.

The bile is not always secreted in equal proportions, but more at some times than at others, though perhaps the quantity is more generally equal in the horse, than in any other animal. The secretion is less when at rest than during exertion; hence the reason that horses long confined in the stable without exercise, have sometimes biliary concretion, and often costiveness: for the bile hardly flowing out, at last concretes; the lymphatics taking up its watery part. In jaundice the bile is supposed to get into the blood vessels both by the absorption of the lymphatics, and by regurgitation through the biliary duct into the hepatic veins. The liver in many animals is the peculiar seat of worms; out of eighteen rats that were examined, sixteen were found with tænia within its substance. The disease termed the rot in sheep appears to arise from a species of worm within the gall duct, and Monsieur Chalette has often found them in horses also.

The Pancreas.

The *pancreas* is a conglomerate long glandular body situated behind the liver, to the left region of the epigastrium, between the stomach and left kidney, with a portion extending across the spine, and which is the only part that can be seen on opening the abdomen, while the stomach is in its natural situation. (*Vide f, Plate* IV.) Its superior surface is applied to the abdomen, and its inferior to the great curvature of the stomach; it is also connected to the omentum, liver, duodenum, and spleen, and to the vena cava; it has a small portion like an appendix, which is connected to the duodenum, and called the little pancreas: this sometimes furnishes a small separate duct penetrating that intestine. Its substance is formed of small glandular bodies, within which, the ducts collect into several branches, till they form the principal pancreatic duct, that penetrates the duodenum usually with the biliary (*vide f, Plate* IV),

by one common opening; but which, if cut into a little way, presents within it another distinct orifice.

Use of the Pancreas.

This gland secretes a fluid very much like saliva, whose quantity, if we compare its size with the salivary glands, must be considerable. Its use has been supposed to be the melioration and attenuation of the gall and the chyme in the alimentary canal: but from the experiments of Mr. A. Cooper, he supposes it co-operates with the bile in decomposing the chylous from the fæculent parts of the chyme or digested mass. Till its duct was discovered in 1642, by Vertsungi, it was said to act as a bolster for the stomach to rest upon. It is not very liable to disease in the horse, though now and then calculi have been found in it. This part in calves is similar both in structure, appearance, and taste, to the thymus gland, and is used as such by the butchers.

The Spleen.

The *spleen*, or *milt*, is a viscus of an apparently glandular structure, but without an excretory duct, of a rusty brown colour inclining to blue, but which varies according to age and circumstances: it is situated in the left hypochondrium, between the great extremity of the stomach and the left kidney (*vide p*, *Plate* IV). Its figure has been resembled to a scythe, but neither this, nor its size, are by any means always alike: it is frequently more of a pyramidal or triangular form. By its upper convex surface it is attached to the ribs, and by its inferior it rests on the abdominal viscera. The inner or concave part presents a kind of groove which divides it into two portions, an anterior and a posterior; within which groove are the openings admitting the splenic vessels. It is connected by cellular substance to the left kidney; by the vasa brevia to the stomach, and to the pancreas by other vessels; as well as by membranous productions to other parts. The *splenic vessels*: Both the artery and vein of this viscus are large; and as the latter arises in its minute ramifications from the cells of the internal part, so it must be evident the circulation performed is slowly carried on; for when a vein originates from the capillary branch of an artery, there must be some force to propel it onward, and hence the circulation will be increased. The *splenic artery* is likewise a considerable one, but it does not originate, as in the human, from the cœliac, to which there is no correspondent artery in the horse; but it is given off at once from the aorta, and enters it at its groove. It receives a moderate proportion of nerves, and is plentifully supplied with lymphatics.

Uses of the Spleen.

From the cellular texture of the spleen, its large blood-furnishing trunks, and the systematic detention of the blood within it, it is evident, it must have some particular office in the economy to per-

form; but what this is, has been a subject of much conjecture. From some accidents, and experiments, it appears not essential to life. It has been often removed in dogs without any apparent ill effects: but though its removal may not occasion fatal consequences, yet it does not follow, that it has not some great use in the system. It has been considered as an assistant in the formation of bile, by retaining the blood to render it more venal, and more easily acted upon. Dr. Haighton's experiments tend to shew that it is a grand auxiliary in digestion, by sending the blood it receives when the stomach is inactive, to that organ, when it is distended and in full secreting action. The stomach thus receiving more blood than usual, can secrete more than usual. But the origin of the splenic artery is not the same in the horse as in the human, which has been given as a reason against this use of the spleen: though not perhaps with much force; seeing that in the horse some speciality might be expected, as his stomach is so little a digestive organ, compared with that of the human and some animals.

The Renal Capsules.

The *superrenal glands* are two bodies, situated at the anterior part of the kidneys, to which they are usually connected. Their size is by no means always the same; but, in most animals, they are more considerable in the young than the old subject; and in the human fœtus, they are as large as the kidneys themselves, but which difference is not observable in an equal degree in the colt. Their figure is irregular, and may be judged of by a reference to *Plate* IV, *m*, *m*; their colour is a bluish tint, with an apparently granulated structure. They receive their vessels from the emulgents usually, and are retained in their situation by them, and by their attachment to the kidneys, as well as by the peritoneum, which covers their inferior but not their superior surface. Their use is wholly unknown.

The Kidneys.

The kidneys are two glandular bodies (see *c c*, *Plate* IV), situated in the superior and posterior part of the abdomen; the right being generally the most anterior, and attached to the hinder edge of the liver, laying under the sixteenth or seventeenth rib; while the left is the more posterior of the two, being pressed backwards by the spleen, and is usually situated under the last false rib. The kidney bean, so named after these parts, serves to give a pretty exact idea of their shape, both in the horse and in the human: but they are by no means of a similar form in every animal, and often even vary in animals of the same kind. The right is usually rather triangular; and both, as being but partially covered with the peritoneum, may be said to be without its sac, as well as their excretory duct. In many brutes, as the hog, oxen, and sheep, they are imbedded in fat; but in the horse, dog, and most fleet animals, there is less adeps

around them; yet in all cases they are surrounded by a quantity of cellular or adipose membrane; and when this is removed, their external coat appears, which is very smooth and compact. They are sustained in their situation by the peritoneum passing over their inferior surface, and by their vessels, as well as by the cellular substance we have noticed. In the young subject of the horse, and many other animals, as well as in the human infant, they are formed of distinct lobes; in some of these they remain thus through life: the bear at all ages has a lobulated kidney. The internal structure of the kidney is not the same throughout, but appears, when cut into, composed of an external reddish part, called the cortical; an internal whitish part, termed the tubular; and a cavity called the pelvis. The *cortical part* is of a reddish brown colour, and granulated structure, surrounding the tubular, and very vascular, from the emulgent artery ramifying throughout it. The *tubular portion* is striated, and appears composed of numerous minute tubes, which receive the urine from the grains of the cortical portion, in which it is secreted by the minute ramifications of the emulgent artery. These minute tubes carry the urine to others, which increase in size, and at length pour the contents by tubular openings into the cavity we mentioned. The *pelvis* is this cavity within the substance of the kidney, which in the horse is uniform, but in man divided into three portions, and lined by a white strong membrane. From this cavity passes out the urinary duct called *ureter*, which appears formed from a continuation of its inner membrane mixed with muscular fibres. The *vessels of the kidneys* are termed *emulgent*. The arteries are very considerable, and are supposed to carry not less than a sixth of the whole blood of the body to these parts. Sometimes there is more than one to each; but it is more usual for there to be one only, which generally goes off at a right angle with the aorta, behind the origin of the anterior mesenteric artery; by which means the motion of the blood is rendered slower. The left emulgent artery is very short compared to the right, from the aorta laying to that side; it likewise arises usually a little more anteriorly than the other: each proceeds to within a small distance of its respective kidney, when it divides into two or three branches, which penetrate the sinus of the kidney, and ramify throughout the cortical portion, probably, by three terminations; the venal, the supporting, and the secreting. The *emulgent veins* arise from the venal terminations before noticed, and unite into two or three trunks, which, passing out by the same sinus in each kidney, immediately unite and follow the direction of the arteries; the right being much shorter than the left, on account of the situation of the cava being towards the right side, and both terminate in the vena cava, the left rather posterior to the other. The *right and left emulgent artery and vein* give each a branch to the capsulæ renales; and the left emulgent vein frequently receives the left spermatic vein. The *nerves* of the kidney arise from the splenic and hepatic plexi, which form a species of nervous network around each kidney, called the renal

plexus, from which the kidneys are furnished. The lymphatics are considerable, and accompany the emulgent veins, terminating at length in the receptaculum chyli.

Use of the Kidneys.

From the quantity of blood the kidneys receive, we are led to suppose them very important organs, whose use we now know to be to separate from that fluid some parts whose stay would be deleterious. It is remarkable that many substances taken into the stomach, and absorbed by the lacteals, have their properties or sensible qualities rendered latent so long as they remain in the stomach, or in the lacteals, and even in the blood: but as soon as any separation takes place within the kidneys, these substances recover their qualities; hence cantharides received through this medium, or by the surface of the skin, produce no sensible effect on the blood vessels, but, as soon as they have been separated from it by these organs, they then produce the most sensible effects; inflaming the kidneys, ureters, and more particularly the neck of the bladder, producing strangury. Nitre thus produces its diuretic effect, and resin likewise; neither being active while existing within the blood vessels; but as soon as circulated through the kidneys, they produce a high degree of stimulus to those organs, whereby they separate much more of the watery parts of the blood than usual.

If blood is examined in the emulgent artery, and the emulgent vein, that in the vein will be found to have the least serum; therefore, we have reason to suppose, that the serum or watery parts of the blood are those taken up: but these are not the only parts separated, for there are other fæcal ones, whose stay would be hurtful; hence the urine is found to be a very compounded fluid: this is further proved by the decomposition that sometimes takes place within the kidneys and bladder, whereby calculi are formed within them; hence, therefore, we may reasonably suppose, that these organs form a grand emunctory for the separating and passing off some unnecessary and probably noxious parts of the blood, in a more substantial form; while the skin and the lungs do the same with regard to some parts that exist in a more rarefied form. The kidneys, like other glands, have their particular stimuli; and these parts in the horse are very irritable. Many of the urinary stimuli are unknown to us; others arise from substances taken in through the skin, or by means of the stomach, which, after having gone the round of circulation, enter the kidneys with the rest of the blood, and stimulate these organs; by which means they not only become more vascular, and, as such, can separate a greater quantity of urine from the increased quantity of blood; but, probably, the vessels themselves, by this stimulus, have a power of separating more watery parts from the same quantity of blood.

In man, and in many animals, we have but little power over the kidneys; that is, they are less irritable than many other parts, and hence we find it difficult in some instances to increase their action

or secretion: but in this subject, the kidneys are more easily acted upon, and no substances are more certain in their operation than those, which are termed diuretics. When a horse has been debarred from water for two or three days, and then allowed to drink freely, the water alone has proved a most active diuretic: perhaps this is connected in some measure with the natural tendency the blood has in him to possess but little serum: thus, when the horse has so fasted, and thus so drank, still a larger quantity of serum, on examination, has not been detected in his blood; from whence we learn, that the kidneys are on the watch, as it were, to separate any superfluous part, and that very quickly. There is a great connexion between the kidneys and skin: in summer, when much fœcal matter is evacuated by sweat, but little urine is formed; but in winter, when there is but little perspiration, then much is secreted. That the urine is separated from the blood, is evident; for, in those animals who do not drink, as the rabbit, hare, &c., it is nevertheless formed: and if a horse is kept without drink, he still secretes this fluid, though in a diminished quantity; and that it is intended, not only to carry off some of the watery parts of the blood, but likewise other matters, is evident from fowls, who have kidneys, but no urinary bladder: therefore in them the urine is deposited in the intestines, in a white saline mass, and which forms that white portion at the end of their dung.

From the great vascularity of the kidneys, they are subject to inflammation, to calculous concretions, and to diabetes; and as their office is important, so under inflammation the effects produced are as serious and destructive as would occur in other parts of twenty times their magnitude. The most frequent ailment, however, to which they are exposed, is that of being bruised by the action of the lumbar muscles in violent exercise, which bruises produce a læsion of their fine vessels; and hence it is so common for horses who have been hard ridden, to make bloody urine afterwards.

The *ureters*.—The urine having been separated from the blood, and passed into the pelvis of each kidney, is then carried off by means of two muscular tubes, one to each, called the *ureter*. (*Vide n n, Plate* IV.) These canals pass out at the posterior part of each sinus, and are continued backwards, not altogether in a straight direction; being continued towards the bladder, they gradually approach each other, and are crossed upon by the spermatic rope, and finally inserted at some distance from each other within the bladder, not far from its neck, piercing the coats obliquely, and running between them; by which mode of insertion the tunics of the bladder perform the office of a valve, permitting the entry of the urine, but preventing its return. The ureters are composed of three coats, or portions; an external, membranous; a middle, muscular; and a third, internal or mucous: their muscularity is, however, denied by some; but in the horse it is evident, from his position, that the urine cannot gravitate; and therefore must be propelled by some

agency, which can only be muscular: both at their origin and insertion, they are uncovered by the peritoneum. Their use is evidently to conduct the urine into the bladder.

The Pelvis.

That part of the abdomen, which is included within the ossa innominata and sacrum, is called the cavity of the pelvis. The posterior portion of this does not come within what is called the cavity of the abdomen, seeing the peritoneum does not reach to the bottom of the hollow, but only extends to its anterior part; so that all the viscera of the pelvis are not wholly within the peritoneal investment.

The Bladder.

This is a membranous and muscular sac of a pyriform shape, or in some measure like a double cone, situated partly within the peritoneal cavity, and wholly within the hollow of the pelvis when not distended. It rests on the pubis, and has the rectum immediately over it in the horse, and the uterus in the mare; but when distended, it extends beyond the pubis, and may be felt in the belly. Those who are in the habits of visiting sick horses, should accustom themselves to the knowledge of an empty or distended bladder, from external examination only; as retention of urine is a very fatal, though fortunately an unfrequent disease. The bladder has a base, which is the middle portion, with an anterior and posterior apex; and, contrary to the human, is smaller in the female than in the male. It will contain, when distended, several pints; but the acrimony of the urine, or the stimulus of distention, or, perhaps, both these causes conjoined, seldom permit it to remain till the full quantity is collected. The peritoneum covers only its anterior portion, by a prolongation extending over part of the inferior surface only; from the superior portion it passes on, and is reflected over the womb in the mare, and on the rectum in the horse; but it does not reach to the posterior part, but leaves thus much of the rectum, and the upper surface of the bladder, uncovered by the peritoneum, so as to wholly exclude this viscus from the peritoneal cavity, except its anterior part. It becomes necessary to be aware of this, as it would be a matter of great import, when making an opening in the bladder, to do it without the peritoneal cavity; which therefore, it is evident, may be done by means of a puncture through the rectum: but we shall have occasion to mention a still better mode, though it is not improper to be aware of this also. The bladder is composed of three coats, or portions; one forms a dense cellular portion, and appears a continuation of the same part of the peritoneum; the true lamen covering, as we have explained, only its anterior part: the next coat is its muscular, the fibres of which are compacted together by cellular substance, and appear laid in every direction; but principally it has an external plan, which

is placed longitudinally, with an internal transverse; intermixed likewise with others whose course is oblique, and of no determinate direction.

By the action of these fibres, the bladder can contract itself so completely, as to throw out the last drops of urine, which could not so readily be effected, had there been only the longitudinal and transverse plans. In dissections of the human subject, and of animals who die violent deaths, the bladder has been found in some instances so contracted as almost to form a solid mass; so great is the force with which these fibres can act. The natural contraction of the urinary sac is a gentle perpetual motion without intervening relaxation, except when it is nearly empty, and then there are some violent contractions, with alternate relaxations. The muscular structure composing the bladder, like all other muscular parts, may be brought into a state of paralysis by over-distention: hence, if by any means the bladder is long kept from evacuating its contents, it becomes so distended as to lose its power of contracting, and the horse, without relief, dies from its rupturing. Its sphincter is a circular set of muscular cords around its neck, whose contractions completely shut the opening into the urethra. The inner coat of the bladder is the mucous, or villous, which appears very vascular, and secretes a thick mucus for the defence of the surface against the irritating effects of the urine; and when, by any means, as by inflammation, this becomes defective, this organ is in the most irritable state. The bladder is connected in its situation by portions of the peritoneum, which are called its ligaments; and by the urachus, which is a ligamentary rope that extends from this viscus between the peritoneum and linea alba to the navel, and which in the fœtus is pervious, and carries urine from the bladder. The remains of the umbilical arteries are within this ligamentary rope likewise, and pass with the urachus to the cyst, to be continued up to their origin in the iliac arteries. At its posterior part the bladder is pierced by three openings; two of which are situated near each other, and at a small distance from the superior part of its neck: these are the openings of the ureters, by which the urine flows into this sac. The other forms the outlet, and is termed the *neck*, ending in the beginning of the urethra, which is the continuation of this outlet. The arteries of the bladder arise from different branches of the internal iliacs; the venal trunks return their blood into the internal iliac veins; and the nerves are given from the sacral and abdominal plexi.

Uses of the Bladder.

It would have been inconvenient to the animal had the urine been constantly passing away, as must have been the case without this reservoir; but which collects and contains it, till by its distention the muscular fibres are stimulated to contract upon it; the sphincter is then forced to give way, and the urine flows out. Calcareous concretions, in the form of either gravel or stone, are now and

then, though but seldom, apt to form within this sac: it is likewise liable to inflammation, and to collections of inspissated mucus; and, at times, to a palsied state of the sphincter; all which will be treated of hereafter. The bladder in the horse is not much an organ of sympathy; but in some animals, as the dog, it is very much so; fear stimulates it strongly; and certain smells have a wonderful effect on it in the canine tribe; and which is not dependent on lust, for it is observed in bitches, without the œstrum on them, and in cut dogs also. In the human, this viscus is an organ of surprising sympathy. The sound of music is an irresistible impulse to some persons to evacuate their urine: plunging the hands in cold water proves imperatively so to many; and other circumstances, apparently equally remote from any connexion with it, excite its contractions in others.

THE MALE ORGANS OF GENERATION.

That the creatures which Providence has formed may not become extinct, they are endued with a creative faculty of their own; and that they may be excited to call this power into action, they have certain impulses, whereby the generative act becomes necessary to their happiness. In man, whose passions are under the influence of reason, and whose intellectual pursuits check the natural appetites, carnal love is controlled; but in brutes, who have only the gratification of their appetites in view, lust is an irresistible impulse. The sluggish, and otherwise insensible ass, will swim wide rivers, leap hedges, and even go through fire, to prosecute his asinine amours; and such is the ardour of a frog, while under the act of copulation, though with him there is no immediate union of sexual organs, that he will suffer his head to be cut off, and yet not be deterred from attempting the completion of the act, which in this animal requires many days. The means whereby the great work of propagation is effected, is different in the higher and lower orders of animals; being much more simple in the latter, and consequently more complete. In quadrupeds it is brought about by the intervention and union of particular organs, in an act termed *copulation;* and the organs themselves are hence called *organs of generation.* These are distributed between the two sexes, so as to oblige each of them to take a part in this duty; and, from their mutual efforts, a new creature is formed, similar to its parents. The genital parts in the horse are most of them external: on the contrary, in the mare, they are mostly internal; and both in the one and the other, they have an intimate connexion with the organs concerned in the formation of urine; whereby one set is made to answer a double purpose.

The *scrotum* is the envelopement of the testicles, formed from the integuments of the abdomen, elongated into a pocket, or bag-like form, and extended likewise to the large tubular covering of the yard, called the sheath. Outwardly it is smooth, and deprived of hairs; internally, it is lined by a cellular substance, which unites itself by one surface to the exterior cutaneous covering; and by the other to

a muscular expansion called the *dartos*, which forms a capsule for each testicle, being divided into two cavities, by means of a septum; leaving no communication between the two, whereby disease is prevented from communicating so readily from one to the other.

The Testicles.

Within these two sacs are the two *testicles*. Nature appears to have given two, that if one becomes injured or diseased, another yet remains; for the propagation of the species is nature's grandest work, and the resources she gives to animals for this purpose are very great. The testes are two glandular bodies, which in all animals are first formed within the abdomen; and in some, as in birds, always remain there. In the fœtal colt they are lodged within the belly, immediately behind the kidneys, and are retained there till some time after birth, when they begin gradually to appear within the scrotum. What influenced this peculiar passage of the testicles into the scrotum, was long a matter of dispute: in man it was supposed to be occasioned by their gravity; but this could not be the case in the brute; nor can it be effected by respiration, as we find them already in the scrotum of some animals before they have breathed; and in others, as the hedgehog, they remain within the belly, though respiration is always carried on. But by Mr. Hunter some interesting discoveries were made on this subject; he found that the testes, when situated within the cavity of the abdomen, were enveloped by a prolongation of the peritoneum, in the same manner with the other viscera; and were attached likewise each of them to a ligamentous substance of a pyramidal shape, whose base, or broad part, adhered to the testicle, and its other portion continued through the ring formed from the separation of the fibres of the external oblique muscle; and that it became attached finally to the bottom of the scrotum: this ligament he termed *gubernaculum testis*. It attains its full growth before birth; after which period, it begins to contract and shorten itself; by which means, as it cannot draw the scrotum within the ring, nor free itself from the testicle; it therefore draws the testis itself from its situation under the psoas muscles, and which carries with it the covering of peritoneum it had around it, and this it is that forms its tunica albuginea. (*Vide i, Plate* IV.)

This progress is carried on gradually; and when the testicles by this contraction have been drawn to the ring, it is evident they must there meet with some obstruction; for the peritoneum surrounds the whole abdominal cavity, as we have described, and only permits the passage of this ligament; consequently in yielding to the pressure, it must either open, or be forced down: it appears that it does the latter; and that the testicles, before invested by the peritoneal covering they had in the abdomen, from their tunica albuginea, now force along with them this fold that was opposed to the ring, and which they carry with them, but which does not become united to them, but remains loose, and forms the tunica vaginalis to each (*vide h, Plate* IV); which is finally carried into the scrotum with the testi-

cles by the complete contraction of the gubernaculum testis, which becomes afterwards wholly absorbed.

In the human, after the testes have passed the abdominal rings, a complete union takes place between the vaginal, or outer reflection of the peritoneum and the surrounded rope; by which means all communication with the scrotum and abdomen is shut out: this is a wise and kind provision to man; for, from his erect position, were it otherwise, there would be a continual descent of some of the intestines; and, probably, a continual collection of the interstitial fluid of the abdomen: and in the few instances that do occur where this is left open, these effects ensue; that is, some of the contents of the abdomen make their way into the scrotum; which forms what Haller has called *hernia congenita.* But quadrupeds, from their horizontal position, not being subjected to this descent, have not this opening closed: therefore, in the horse, a communication between the scrotum and abdomen remains; this prone situation rendering quadrupeds in general but little subject to scrotal hernia. We must, however, except dogs, who, from this abdominal opening, and the great length of their omentum, are not unfrequently troubled with epiplocele.

The *coats of the testicles* are commonly reckoned as three; the expansion of the cremaster, the tunica vaginalis, and tunica albuginea. The *cremaster* is a muscle that arises from joint fibres of the obliquus abdominis and transversalis abdominis muscles, with some fibres from the fascia lata; forming a slight muscle, that is continued with the spermatic cord down to the testicles, when it becomes an aponeurotic expansion that inserts itself into the tunica vaginalis (*vide h, Plate* IV): this, therefore, cannot properly be considered as a tunic of the testicle. The *tunica vaginalis* is the second portion of the peritoneum we have described as descending by the pressure of these glands, which loosely surrounds them, and forms a firm sheath to each; in *Plate* IV, this is seen open from the right testicle. The *tunica albuginea* immediately invests the body of each, being the portion of the peritoneum that surrounded the testicle in its first situation within the abdomen. This coat is white, externally smooth, very firm, and united very intimately by its internal surface to the substance of the testicle: on its outer surface are seen vessels alternately in a direct and wavy course. (*See the right Testicle, Plate* IV.) Having these coverings and appendages, the testes may be considered each as a glandular body approaching to the figure of a kidney, having the great curvature and great extremity directed before, and the lesser curvature and small extremity directed backwards, and towards the abdomen: to the posterior portion is attached the appendix, or epididymis. Its internal surface appears formed of an infinite number of very minute tubes, which appear the secreting ramifications of the spermatic artery, so minutely divided, that Dr. Monro has calculated that their length, when united in a human testicle, would be not less than 30,000 feet. After this numerous and minute division, the semen having been formed from the arterial blood, these firm tubes gradually form several ducts, which inosculate

late together, and increase in size, but diminish in number, to form what are termed the vasa efferentia. The *epididymis* is formed from the united mass of these vasa efferentia, and is situated at the posterior external surface of the testicle, having a bulbous head, within which these tubes take a very convoluted direction, as may be evidently seen on the outside (*vide k*, *Plate* IV, *right Testicle*) : as it proceeds upwards it lessens, and finally forms one canal, termed the vas deferens.

The *vessels of the testicles*.—The spermatic arteries are a principal one to each testis, which arise from the inferior part of the aorta (see *Plate* IV), a little behind the emulgents: soon uniting with the spermatic veins, both proceed backwards enveloped with cellular membrane, passing obliquely over the psoas muscles, diverging gradually from each other as they cross the ureters, when they pass downwards and outwards to gain the abdominal ring. In their passage, they give a branch to the adeps of the kidneys, peritoneum, and other parts, without apparently diminishing their size; and when arrived at the abdominal ring, they are continued with the vas deferens, which is invested in the same sheath, and are ramified throughout the body of the testicle in the manner described. The spermatic veins receive within the testicles the blood that is not taken up by the secretory power of the organs: passing out of the testicles, they form several trunks, whose convolutions are numerous, and their communications very free with each other, so as to make a varied plexus of venal branches, which pass upwards, and terminate, the left usually in the left emulgent, and the right in the vena cava. (See *Plate* IV.) The *nerves* of the testicles are usually a branch to each, received from an abdominal plexus; and its *lymphatics* may be seen spread over the surface of each. Each *spermatic cord* is, therefore, composed of the spermatic vessels, the nerve, the vas deferens, with the lymphatics, and the cremaster muscle, united into one rope, by a cellular substance, which passes from the abdomen to the testicles through the abdominal ring, not as in the human, in an oblique direction, but in a right line.

The *vasa deferentia* are the united trunks of the secretory vessels of the testicle, continued one from the upper extremity of each epididymis. The internal cavity of each vas deferens is small, but its substance is strong and white, running up with the spermatic artery and vein, and entering the ring within the general sheath of the rope, when it separates from the blood vessels, and proceeds upwards and backwards to the superior and anterior part of the urachus, crossing the ureter in a particular manner (see *Plate* IV) : each is then continued over the lateral and superior part of the bladder, to gain the posterior portion; when it enlarges into a long oval cavity, which is cellular in its structure. This cavity is about the same size with the vesiculæ seminales, and each is laid immediately before, and alongside the seminal vesicle; this cavity diminishes at the neck of the bladder, its canal running parallel with that of the vesiculæ seminales, and terminates alongside of, though dis-

tinct from, them; one on each side of the urethra; in such a manner, that though these two canals are contiguous, and their openings contiguous, yet it is impossible that the semen should enter the vesiculæ seminales. Their orifices are within the urethra, at the part surrounded by the prostate; the vesicula, and the vas deferens of the right side, opening into the right side of the urethra, and those of the other on the left. (*See these parts in Plate* IV.)

The *vesiculæ seminales*, as they are improperly termed, are two oblong receptacles, situated one on each side of the neck of the bladder, behind the dilatation of the vasa deferentia. They are not, as in the human, of an externally knotted appearance, and internally formed into a number of convoluted cells; but are externally equal, and internally each forms a single cavity: they are covered by the general cellular substance, and by it are connected to the bladder. In form, appearance, and size, they are very similar to the enlargements of the vasa deferentia, ending at one extremity by a round end; and, at the other, are each diminished into a small canal, that lays contiguous to the canal of the vas deferens, and opens just without the opening of that; the form and appearance of which may be seen, by referring to *Plate* IV. They contain a fluid very similar to that of the vesiculæ seminales, and which is undoubtedly intended to mix with it: but they cannot be the receivers of the semen; for the openings are distinct, and water, passed by the vasa deferentia, never enters the vesicles. In the human, the mechanism is in some measure different, and water, passed in thus, will in some instances enter them. Mr. Hunter was first induced, from his observance of brutes, to conclude, that, even in the human, these secreted a fluid, sui generis, that was to mix with and dilute the semen: and he proved that they could not be seminal receptacles; for they appear to be as full in the cut as the uncut horse. There is a small canal, at the superior part of the neck of the bladder, that opens sometimes into one, sometimes into the other of the canals of these seminal adjuncts. Bourgelat says, it bifurcates, and has a distinct opening on each side: but this I have not observed in the subjects I have examined. It appears only an appendage to the vesiculæ, and probably answers the same purposes.

The *prostate glands*.—These are glandular bodies, whose appearance is by no means similar to the human prostate; for instead of one, there are in the horse evidently two irregular bodies, placed one on each side of the membranous part of the urethra, near to the neck of the bladder, surrounding the posterior part of the vasa differentia, and vesiculæ seminales, and being situated superior to them, over the urethra, so that they lay immediately under the rectum, where they may be readily felt, by introducing the hand within that gut. Their internal substance is spongy and cellular, and each has several little ducts which open on one side of a rising line in the urethra, termed verumontanum; by which ducts a thick cream-like fluid passes into the urethra. *Cowper's glands* form two lesser glandular bodies, which, in the human, are frequently wanting; but in the

horse are always distinct, and of the shape and size of a chesnut, situated just beyond the prostate, one to each side. (*Vide g g, Plate* IV.) The structure of these differs from that of the large prostates, inasmuch as their cavity is more regular and definite, and their substance less spongy: they are covered by the transversalis perenei muscles, so as to give them a regular muscular strata, that probably impels their contained fluid, which is not unlike that of the prostates, and is poured out near them by similar openings, rather below and beyond.

The Penis, or Yard.

The penis, or yard (*vide Plate* IV), is a long firm body, nearly two feet in length, with one part almost prismatic, but towards the anterior extremity cylindrical: in its natural situation, it is covered externally by the sheath, which is a continuation of the general integuments of the belly, continued from the scrotum. The *sheath* of the horse is very different from the skin of the human penis; for, as in the horse this part is a real prolongation of the cutis of the abdomen, so it is connected to it throughout, in some animals more closely than in others. In the usual state, the penis is entirely hid within the sheath, which is of considerable extent, being continued from the scrotum to near the navel, where it appears to terminate, but it only turns in: at this part it is much thicker, owing to firm ligamentous substance within, that forms a kind of ring, and which is useful in keeping this part open and firm: from this, the integuments become thinner and more vascular, and, running within, encircle the whole glans, but not exactly in the same manner as in the human. This is the situation of the parts when the penis is retracted; but when erect, it appears a large long body distended out beyond its covering; and it will then be found, that the ring, forming the end of the natural sheath, now forms an enlargement around the distended penis, and that the integuments are stretched from it in a true continuation over the whole extent of that part which appears without its vulva, being firmly attached to the extremity, or head, but loosely only to the rest of the parts*: when the penis again contracts, it enters the sheath, and draws this portion with it, which is called the prepuce; within which is seen a moist secretion that keeps these parts from adhering. The body of the yard is composed of two cavernous flatted portions closely connected, and a spongy canal admitted within an inferior groove.

The *urethra* is this spongy membranous canal continued through the body of the penis from the neck of the bladder, of which it appears the continuation. Its first portion is simply membranous, and lays within the depressions formed by the two prostates; the next is made up of that which lies between the two Cowper's glands: thus

* In the plate, the prepuce is distinctly seen laying in folds, as it does when the yard is not distended; the ring around is the enlarged part of the sheath where it turns in, to form all the inner portion, which is distinguished by the name of prepuce: the portion beyond this is the ligamentary coat.

far it is within the pelvis; but as it passes around the pubis, coming from behind forward in the great angle, formed by the posterior junction of these bones, it loses its membranous structure, and becomes at once considerably enlarged, by gaining an acquisition of muscular fibre. It therefore is evident it must, in this course, make an acute angle; for while within the pelvis, and proceeding from the bladder, it is continued backwards, laying upon the uterus in the mare, and upon the pubis in the horse. Continued in this direction (see *Plate* IV), it passes at once around the posterior junction of the bones of the pubis out of the pelvis, and then proceeds on the outer side of this bone, directly forward. In the human subject, though the urethra makes an equally sharp turn around the inferior part of the pubis; yet as in him the penis is unconfined, so a sound, or catheter, can be introduced into the bladder: but, in the horse, the angle being rendered so very acute by the attachment of the penis to the belly, we can only introduce any instrument as far as the perinæum; and if we wish to introduce it farther, we must make an external opening in that part on the introduced instrument, and repass the same instrument, or another, within the canal, just as it describes this angle, it being here surrounded neither with spongy substance, nor with the prostates. At this part, therefore, it is very thin, and forms the proper point at which to open it; and fortunately this described point is exactly the portion that presents itself in the perineum on passing a sound.

As the penis turns the angle of the pubis, it receives a species of ligamentary expansion from these bones, and after it has turned them, and gained the under side, it receives the cellular envelopements described, and which are continued around it through its whole length, to the extremity of the penis. This sponge-like portion of the urethra communicates with the cavernous substance, and is retained between two membranous portions; one of which is the inner mucous membrane of the urethra, and the other a true membranous covering to the spongy part. This internal mucous coat of the urethra is very vascular and sensible, and is pierced by the several openings of the vasa deferentia, the vesiculæ seminales, the prostates, and Cowper's glands; besides which it presents, through its whole length, the orifices of small mucous ducts, termed lacunæ: the canal at length terminates in a fossa in the middle of the head, or extremity of the glans penis, by a projection of its inner membrane. (*Vide g, Penis, Plate* IV.)

The *corpora cavernosa* are two cavernous bodies attached to the bones of the ischium and posterior part of the pubis: they soon approach each other, and join just before the symphysis; not in the manner of the human, like two tubes applied to each other, but like two flattened half tubes; these unite so intimately as to appear but one body, which is not circular, but prismatic. They are externally covered by a very strong membrane; internally, they are cavernous, with strong transverse muscular fibres that intersect each other, and mixed with a compact cellular substance (see *Plate* IV). These

cells are always filled, more or less, with blood, but when the penis is erect they are fully distended: those of the cavernous communicate with the cells of the spongy portion. The cavernous bodies terminate some inches before the extremity of the penis in a rounded end, which is received into a corresponding depression in the glans; and throughout the whole extent are grooved underneath, receiving the greater portion of the urethra.

The *glans penis* of the horse appears a distinct part, and not formed, as in the human, of an expansion of the spongy portion of the urethra; it is also unlike that of man, in being cylindrical, and extending some inches up the yard; connected to the corpora cavernosa, and spongiosa, by a strong cellular connexion, and by a continuation of the ligamentary integuments of the yard, receiving the rounded end of the corpus cavernosa into an appropriate depression. It is larger than the body of the penis, is cylindrical, and covered with the general ligamentary expansion, and with the prepuce. Its internal substance is very spongy and cellular, so as to admit of equal expansion with the other parts of this body, and ends in a kind of ring around its verge, which is larger and more prominent above than below. This anterior surface of the glans presents a considerable depression, or fossa, with an eminence in the middle, which is the termination of the inner membrane of the urethra: this forms the fossa into an anterior and posterior division, within which there is usually a quantity of sebaceous matter. The whole surface of the prepuce is furnished with glandulæ odoriferæ, secreting a sebaceous matter, which sometimes becomes so acrimonious as to irritate and inflame the yard, and produce a running, or gonorrhœa. The *muscles of the penis* are three pairs; the erectors, the accelerators, and triangulars. The *erectors* arise from the tuberosity of the ischium, embrace the two roots of the cavernous body, and are inserted into its lateral parts; by their contraction they apply the penis to the belly, consequently are of great use in *covering:* their action must be very strong to counteract the weight of the yard, which, by acting on the principle of a long lever, must be immense. The *accelerators* are two fleshy expansions extending over the bulb, and nearly the whole length of the urethra, by which means the urine and semen are ejected from the urethra, and the canal kept closed when it is not passing one or other of these fluids. The *triangulars* are similar expansions spread farther back, influencing the prostate and Cowper's glands, and assisting the last. (See *Myology.*) These described portions of the penis are immediately invested by a very dense, firm, but equally elastic ligamentary lamen, and which has been improperly termed its nervous coat. It covers the corpora cavernosa and spongiosa, and inserts itself into the symphysis pubis. Over this is expanded another membranous investment which forms the sheath and prepuce. The *arteries of the penis* are furnished from the pudendals; but the veins are larger beyond all comparison: the ramifications diffuse the blood through the cavernous cells, and from these it distends the spongy portion. This takes place in a greater

degree; that is, the artery injects more blood than usual, when the influence of the mind extends to the yard, impelled by lust. The *veins of the penis* are likewise branches of the pudendals: in the human there are three or four only on the dorsum penis; but in the horse they are very large and numerous, and form a complete network over the back of it; and which are easily raised altogether in taking off the cellular tissue. By this formation the blood can, in usual cases, be readily circulated, for the artery is but small, and the veins infinitely numerous; but when the artery acts more than usual, then the blood cannot pass off, and distention must be the consequence. The *nerves* originate from the lumbar and sacral.

Uses of these Organs.

Evacuation of urine.—From what has been said it will appear, that the organs we have described are subservient to two important purposes; some of which are concerned in both, others of them only in one of these purposes, which are the evacuation of the urine, and the formation and ejection of the semen. The penis divides its use between these processes; and this forms an instance of one part performing two distinct functions.

We have already traced the urine into the bladder, and we have described the means by which it is passed from thence; we have only, therefore, to remark, that when the bladder contracts, the sphincter is forced open, and the fibres surrounding the urethra dilate, or become passive; the urine then flows out, by the force of the contraction of the bladder, in a considerable stream; and, when finishing, the last drops are expelled by means of the accelerator muscles.

Generating use of these organs.—Within the testicles is generated, or secreted, a fluid, which, when it is formed by an adult and healthy horse, and placed in a proper receptacle, such as the healthy uterus, or womb of the mare, it bestows the power upon the female organs to frame, fashion, and bring to maturity, *a fœtus*, whose parts, habits, and manners, shall correspond with those of its parents. Animals being formed by nature solicitous for the propagation of their species, the appetites conducive to this end are very strong; and any obstruction offered them, when under the influence of lust, makes them ferocious: to quell this, and render them open only to the stimulus of preservation, horses are very generally in this country, and many parts of Europe, castrated. Nature has also wisely ordered that the perfection of the generative organs shall not become complete till the animal is evolved, and arrived at maturity: had it taken place sooner, not only the offspring would have suffered, but the parent likewise; for it is a secretion in which much general power is wasted; and hence, when it begins to form in large quantities, the body ceases to grow: therefore it is that, when we do castrate animals, we do it also early, to make them large; for then the portion of living power that would be expended on the seminal secretion, is employed in the other general secretions of the body; hence more

blood, more bone, and more muscle are generated. It is not only the mere quantity secreted that occasions this waste of power; for there is more saliva formed in one day than the testicles secrete semen in a week or month; but this secretion has a greater connexion with the mind, and the exertion of the mental powers weakens more than those of the body; hence the male of all animals becomes weak in the season when the female has her *œstrum* on her, or is at *heat;* and even without copulation the horse will not thrive, provided he is suffered to be under the influence of lust, by being near to mares. That this secretion has some remarkable sympathy with the body in general, as well as with the mind, is evident from what takes place in cut horses, and what is observed in those uncut. When a horse is early castrated, he partakes of the mixed nature of the horse and mare; his crest is neither so round nor large, nor his voice so deep; his general form also becomes lightened, though his size is increased. In an entire horse, on the contrary, at the time when the semen first begins to form, his person alters, his tones deepen, his neck thickens, and his crest rises; the mane and tail lengthen, and his whole figure becomes round and graceful; at the same time he exhibits repletion, and a strong smell.

In the *act of copulation*, therefore, it appears, that the nervous influence acts upon the vascular system of the penis, whereby the arteries carry more blood, while the veins are rendered unable from some cause to effect its removal, by which means the cavernous cells become filled, and the penis, by this distention, erected; when, from the friction produced by the vagina, the penis becomes stimulated into a more exquisite sensation, with which, by a common consent of parts, the enlargements of the vasa deferentia and the vesiculæ seminales participate; when, by the assistance of the accelerator muscles, the semen and diluting fluids are pressed out, and, by a convulsive effort, injected into the vagina: the stimulus of the semen being lost, the appetite becomes satisfied, the nervous influence is removed from the vessels, and the penis returns to its ordinary size.

THE FEMALE ORGANS OF GENERATION.

Though the division of these organs into external and internal is sufficiently common, it is in this instance, at least, useless; the only parts that can be considered as external, are the bag and teats, with the vulva, or sheath.

The *bag* of the mare is formed of two distinct collection of glands, which, from their proximity, are considered as one. In the multiparous animals, as the dog, the hog, the rabbit, &c., these bags are numerous and distinct, because, from the number of young, it would be inconvenient were the teats not as numerous as the offspring: but in the uniparous, as the mare, cow, sheep, &c., as the progeny at one bringing forth is confined to one, or at most, in ordinary instances, to two; so this part is double, and situated between the

hind legs. In the mare, each of these bags has a *nipple* or *teat*, and the bodies of the glands themselves are made up of an infinity of arterial ramifications; from which a fluid is secreted, called *milk*, which is destined to the support of the young colt, till the evolution of his organs has enabled him to pursue his own means of support. The *teat*, or *nipple* (of which there are two), receives the secreted milk by several tubes, which have separate expellent orifices on its lower extremity, with valves placed superiorly over each opening, by which the fluid, in ordinary cases, is prevented from flowing out; but when the nipple is pressed up, the valve opens and permits the free entry of it; thus the colt is seen to push up the teat with its nose; pigs and puppies with their feet; and a similar action is common in milking of cows. The *milk* in different animals has different component parts, and different tastes; but in each, it has those best adapted to the animal it is intended to nourish.

The *vulva*, or *sheath*, is a long oval opening immediately below the anus, with a very small space between, called the perinæum: it appears formed of two labia or lips, exactly applied to each other, whose junction above and below is called its commissures. The skin that covers them externally is usually black, and deprived of hair, with a line of division forming indented edges; after which the same integuments form the inner surface, but become more vascular, and at last degenerate into, or become blended with the real tunics of the part. The substance of the lips is, besides, made up of some cellular membrane, with a strata of muscular fibres, uniting at the superior commissure to the sphincter ani, and inferiorly to the clitoris: in copulation these embrace the yard, and at other times they support and close the labia. The internal surface of the vulva is kept moist by a mucous secretion from its vascular membrane.

The *clitoris*.—When the inferior commissure is separated, which is thicker and rounder than the superior, it is found to lodge a body that appears like an imperforate glans penis, and which is intended to answer the same purpose in the female, being, by its cavernous structure, filled during copulation, by which its sensibility is increased. The clitoris, like the male penis, has two cavernous bodies attached to the ischium, whose internal structure is cellular, and their external strong and very elastic; they may be inflated also like the penis, either by air or injections: it corresponds with the glans, in having a species of prepuce formed from a fold of the inner sides of the labia, within which likewise are openings pouring out a matter similar to the glandulæ odoriferæ in the male: and it has likewise an expansion of muscular fibres, termed the erectors, performing the same office with those muscles in the male. The *female urethra:* When the labia are separated, the internal cavity is called the *navicular* or *scaphoid fossa*, at the inferior part of which is placed the clitoris, as we have shewn; above this, and rather more internally, is situated the urethra, which in the mare is

a short large canal without any curvature, and simply membranous, with an internal vascular surface furnished with lacunæ similar to the male. Its orifice may be distinguished from a doubling of substance like a fold around it; and when the urine is ejected, the clitoris is brought forwards, and elevated by means of the muscles, so that the urine may be completely expelled, and none remain to irritate the internal surface.

The *vagina* is the long membranous canal that appears above the clitoris, which is capable of great extension, but in the natural state being about eight or ten inches long, and two in diameter. Its direction is nearly horizontal, and situated between the bladder and rectum; by its external orifice uniting with the vulva, and by its internal terminating in the neck of the uterus. It is composed of a spongy cellular substance interwoven with numerous blood vessels; it has likewise a considerable muscular fabric, and internally is lined by a fine vascular membrane secreting mucus, which is thrown into numerous folds, whereby its capacity for distention is much increased. The vagina, uterus, and bladder, are only in part covered with peritoneum, and the extent of this covering is easily seen in the dead subject; for it takes in as much of these parts as can be observed within the cavity of the abdomen. The female bladder, therefore, though it might be punctured like that of the male without penetrating the abdominal cavity, yet it must be through the vagina, and therefore is still less eligibly performed in the mare than in the horse. The superior part of the vagina is bordered by a membranous valvular fold, which Mr. Hunter appears to have mistaken, and has thence been led to assert, that women, mares, and elephants, were the only beings who had a hymen. But this structure, in mares, appears simply a membrane to guide the urine, and to prevent its entering and irritating the vagina; and is situated at the inner extremity of this canal, and therefore differs from the human female hymen, which is placed at the mouth of the vagina. It likewise is not destroyed in those mares who have had foals, and therefore is still less like this part in women: we may add, that monkies are the only animals that have a hymen similar to the human.

The *uterus* of the mare is very dissimilar to the human womb, which is only an uniform bag, but in this animal it has a body and two branching portions, called its *horns*. This organ is implanted into the vagina by a narrow portion, called its neck, from which is continued the body, which is six or eight inches long, and about the size of a small intestine; with the fundus or bottom extending rather beyond the bladder, and bifurcating into two large cornua which also measure six or seven inches, and float within the cavity of the abdomen, one to the right and the other to the left, under the anterior part of the ilium, rather without the pelvis, resting directly upon the large intestines and behind the convolutions of the small ones. In the multiparous animals, or those who have numerous young at a birth, these cornua are very considerable, and

the fœtuses are lodged within them; but in the mare, who has usually but one, the secundines only are lodged within them. To prevent any prejudicial removal of these parts from their situation, the peritoneum, after it has covered part of the uterus, is reflected over the horns, and envelopes the Fallopian tubes. Though the mare has a womb similar to that of a multiparous animal, she seldom has but one foal; and when there are two, they seldom both survive.

Fallopian tubes.—The extremity of each cornua, or horn, has a small conical tube attached by its apex, while its broad extremity called the fimbria, like the large part of a trumpet, with a fringed edge, floats in the cavity of the abdomen, being only slightly attached by one part to the ovaria: they are very tortuous in their direction, and the extremity of each attached to the cornua is extremely small, hardly admitting a hair; but the other is considerable, and turned towards the ovaria. They have rather a firm membranous structure, and at the largest part are the size of a large quill, and about two or two and a half inches long.

The *ovaria* are two oval oblong bodies of the size of an egg, situated at the extremity of the uterine horns, enveloped within a fold of the peritoneum, but floating in the abdominal cavity: they are composed of a compact spongy substance, containing a number of little transparent vesiculæ, called *ova*, whose number is uncertain: each ovum appears surrounded by cellular substance, and is described as having two coats, the outer of which is represented as belonging to the ovaria; for when the vesicle escapes, this remains and produces an indentation, and leaves a green spot, which remaining spot is called *corpus lutea*. The vessels and nerves of the uterus have been described in the sections on Angiology and Neurology.

Sect. XVI.

OF ŒSTRUM, CONCEPTION, PREGNANCY, AND EVOLUTION OF THE FŒTUS.

NOTHING in the animal economy is a greater subject of admiration than that wonderful process whereby a new animal arises from the efforts of the old. In the lower orders of animals, conception and the production of their young appear more simple; but in the higher orders, the process becomes more intricate and obscure. Some of the former produce their young without sexual distinctions, each being fruitful, and capable of the production of its kind: in some, the offspring are produced within the body; in others, by a limb or part of the parent trunk. But in quadrupeds there is a true sexual distinction and division of generating organs; the work of propagation is divided, and it becomes necessary for the male semen to render the female ova prolific, either by direct contact or by

sympathy. The animals called cold-blooded, some of them do it without the immediate contact of sexual organs; but the greater number have a penis intrans, and inject the male seed into the female organs. It is not certainly known whether the semen ever enters the uterus, or whether it is deposited only in the vagina, and produces its great effects upon the ovaria by sympathy. Haller informs us he saw semen in the uterus of a sheep; Verheyneus, in a cow; and Ruysch asserts he observed it in the bodies of two women, who were killed immediately after copulation; the one by her husband, for infidelity; the other was a common prostitute, and was killed by a soldier, her paramour; in both which he states, that he found semen not only in the uterus, but in the Fallopian tubes. Mr. Hunter found it likewise in the uterus of a bitch who was killed in the act of copulation, or immediately after, by puncturing the spinal marrow. Though these appear strong facts, yet still it is not certain that the contact of semen is necessary to the fecundation of the ova, nor that semen always gets into the uterus.

Of Œstrum.—That the great work of propagation might not be left to chance, all animals are irresistibly impelled to it by a sensation called *lust* or *œstrum*. This sensation happily does not arise in any great degree till the organs, by their complete evolution, are fitted to the purposes they are destined to fulfil. In the human, Providence has kindly limited this sensation so as to be under the dominion of reason and modesty; and to this end in ourselves, though it is not violent, it is constant; that it might not, by returning only at stated periods, be of necessity, strong and irresistible. But in brutes it is connected with certain states of the body, whereby the young are produced at proper times; and this act, which is a weakening one, does not by this means always go on; but they have leisure for the gratification of their other appetites. Brute animals, therefore, have their organs sometimes in a state of inaptitude to fecundate; and when they are thus, the disposition to copulation does not exist; but when the aptitude returns, then the disposition returns likewise, and this state is called *œstrum*. The œstrum of the mare is popularly termed *horsing*, and in other animals it has likewise technical terms. At these times considerable changes take place in the generative organs; they become more vascular, are swollen, and a considerable quantity of whitish matter is secreted in the vagina, and ejected occasionally, termed the *heats*: not only do the vulva and vagina appear to have this increase of vascularity; but even the uterus, the cornua, the Fallopian tubes, and the ovaria, likewise participate. The tubes at this time likewise shew a disposition to unite with the ovaria*. When, therefore, all

* As *œstrum*, or *horsing*, appears in great measure brought on by an increased vascularity of these parts; so sometimes the inflaming or stimulating the vagina by artificial means, as by an infusion of cantharides, &c. has been practised. But it is evident, that as this is against nature, and as all the parts may not equally participate in this artificial mode; so it is probable that it would almost always fail. Instances have also occurred of death being occasioned by an injudicious injecting of some acrid fluid into the vagina, to produce this effect.

these parts have become thus vascular, and the vesicles of the ovaria become turgid, the animal is fit for impregnation; and in copulation at this time, in multiparous animals several, and in uniparous one, of these vesicles bursts its outer coat, and escapes, leaving a greenish spot called corpus lutea. The vesicle that has burst its confinement is taken within the Fallopian tube, and conveyed into the uterus by a vermicular motion, which in some of the lesser animals, as in rabbits, it takes three days to effect, and perhaps it is not widely different in all. If a vesicle should burst, under the influence of the semen, and, escaping the fimbriated extremity of the tube, fall into the cavity of the abdomen, and the ovum should be nourished there, it is called an extra-uterine fœtus; and it is evident that the cavity of the abdomen must be opened to deliver it. There have been instances likewise of an impregnated ovum remaining in the ovaria and tubes, and yet coming to maturity. When the ovum has been brought into the uterus by means of the tubes, it continues to float loose some time within it; but at last some changes appear to take place, and it becomes attached, not to any certain portion of the cavity, but wherever chance directs: but during this time there is no danger of its escape, for while the Fallopian tubes are bringing it, the womb is sympathizing in its action, and preparing for its reception, by effusing a quantity of coagulable lymph within it, which completely glues up the opening of the cavity into the vagina. This effusion likewise becomes general, and a thick lamen is formed, which Dr. Hunter first accurately described, and gave to it the name of *tunica decidua*.

Membrana caduca, false or *spongy chorion*.—This membrane Dr. Hunter found to consist of two lamellæ; that which lines the uterus, he named *tunica decidua uteri:* the other being reflected from the uterus over the ovum, he called *tunica decidua reflexi*. The tunica reflexi in the latter months of pregnancy adheres so firmly to the tunica uteri as to be no longer distinguishable into two. The ovum, it will be found, has two distinct tunics of its own; the external is more firm, less transparent, and vascular than the other, and is called the *true chorion:* the inner is a very thin fine membrane, termed *amnios*. These two coats belong to the fœtus strictly; for if the umbilical vessels are injected, these become injected likewise, but none passes to the false chorion; and if the vessels of the mother are injected, the false chorion alone becomes filled, but the true chorion and amnios remain as they were. As this effect is constant, we are led to conclude, that the tunica decidua belongs to the mother, and the true chorion and amnios to the fœtus; and that, though there is a continuity of parts, there is no inosculation of vessels. To these involucra must be added another, which appears after the embryo is formed, and is called the allantois, as will be described hereafter.

The *embryo* may therefore be regarded as being enveloped in the early months by four membranes; the *tunica decidua*, *tunica reflexa*, the *chorion*, and the *amnios;* and in the later months from the dis-

appearance of the reflexa, and the addition of the *allantois*, the number still remains the same. In the human impregnated uterus, if examined within the first month of gestation, there appears a prominent spot upon some part of the surface, and a similar projection on some part of the true chorion of the ovum; these two inosculate with each other, and become a thick round cake called the *placenta;* and this forms the only communication between the mother and fœtus. But in quadrupeds it is widely different: the ovum of the mare, after remaining some time within the cavity of the uterus, has the whole external portion of the chorion thickened and rendered vascular, by which it unites with all the surface of the membrana decidua; and this union takes place not only throughout the circumference of the uterus, but even throughout the cornua: and it may be remarked, that mares are the only animals known, except asses, whose placenta occupies the whole of the uterus. This part, therefore, in the mare, instead of presenting a single spot, appears as a general covering of the ovum, propagating its connexion throughout the whole uterus and its horns *. Before this

* When we consider the economy of quadrupeds, and their particular structure, so wisely adapted to their intended habits, we are not to regard them in the narrow and confined view to which we have subjected them by domestication, which is wholly a life of art, and, as such, unnatural; for, though Providence has given us this power over them, and undoubtedly designed them to be subservient to our use and comfort; yet it was not probably intended that such an utter perversion of nature's dictates should have taken place, as has been introduced by luxury and refinement. Considering the habits of the animal in question, philosophically, we must regard him as living uncontrolled and in common with other animals, many of whom wage eternal war with him, and from many of whom he is to escape by flight. He is likewise to be regarded as being destined to rove in search of food, perhaps to considerable distances: for in a state of nature where these animals congregate, that is, where they associate in herds; the scanty provision raised on one spot, without the assistance of agriculture, would not long suffice the wants of a numerous assembly of wild horses. Therefore, contemplating his habits in a state of nature, we are led physiologically to regard his organs as fitted to this kind of life; and not to draw our inferences from the nurture of the stable, or the education of the riding house. Regarding him therefore aright, we shall find the structure of this noble animal admirably adapted to his economy: the young colt, as soon as foaled, appears capable of making considerable exertions, and is possessed of great speed; by which he can accompany his mother and the associated herd, either in flying from their enemies, or in search of food; and if we examine him attentively, we shall find his exterior form as well as his internal economy admirably adapted to this: his body is very slender, and consequently very light, and his legs long, particularly his hinder ones; by which he is enabled to exert very considerable speed without making any greater exertions than his juvenile state will admit of. On the contrary, in animals who seek the safety of their young by hiding them in holes and caverns, where it is necessary for their preservation that they should remain quiet, nature has wisely given them a correspondent form; their bodies are fat and unwieldy, that thus they may have a constant disposition to rest and sleep; and which is further brought about by their being blind. Their legs also are short, so that every impediment is placed as a bar to their roving till they possess something like the parent strength, and the parent intelligence: but the internal economy of the foal is such, that he has no need of much sleep to quicken digestion; for, in him, the process of solution is not carried on in the stomach wholly, but in the intestines likewise: therefore he can be always alert and on the look out to avoid surprise. In the

inosculation takes place, the little contained animal, or rather the rudiments of the future animal, are nourished by the contents of the ovum; but now they derive their nutriment from other sources.

The *tunica decidua* we have described as being strictly a maternal portion of the uterus; that is, that though it is continuous, yet it has no inosculation of vessels with the fœtal portion; but that the vital principle is absorbed from the mother in the same manner as in the adult state is effected by the ramifications of the pulmonary vessels in the lungs. This lamen is vascular and spongy, and is thence called *false chorion*. The *true chorion* forms the next (or, in fact, the first strictly proper to it) membrane of the fœtus; and presents on its outer surface, in the ruminant tribes, fleshy prominences which correspond with cavities in the tunica deciduа, and are called *cotyledons*, or *placentula*; these appear very vascular, but have no anastomosis of vessels, though the connexion is otherwise considerable. The *allantois* is a peculiar membrane whose existence in the human has never been proved; and in animals it differs much in regard to extent. In hogs and rabbits, it is little more than a tube; in ruminant animals it is more considerable: but in mares, bitches, cats, and some other quadrupeds, it forms a general involucrum. It appears to be an expansion of a canal that arises in the fœtus from the bladder, continued to the umbilicus or navel, when it is reflected over the cord, and over the inner surface of the chorion, and outer of the amnios; so as to form a sac, in which is contained a fluid appearing in every respect similar to urine. This canal, thus leading from the bladder to the umbilicus, is called *urachus*; and it is within this sac, and floating in this fluid, that the substances called *hippomanes* are found; which appear not unlike portions of coagulable lymph, being from ten to fourteen or more in number, usually unattached. The antients supposed they adhered to the forehead of the foal, and that they had peculiar virtues; others have supposed them formed of concretions from the urine; but neither their structure nor formation is under-

stately herds of horned cattle likewise, though the calf can make considerable exertions at birth, yet there is not that studied attention to his speed, and the safety of the offspring consists in the means of defence given to the parent by its formidable horns; and, therefore, to them nature has given a greater degree of ferocity when they have young, that they may make use of these means; but, in the mare, who has them not, she is stimulated to trust more to flight than resistance.

Therefore, that the evolution of the parts of the colt at birth might be such as to admit of these necessary exertions, we find a considerable peculiarity in the gestation of his mother; for, by the very extensive attachment of the placenta to the whole surface of the uterus and to the horns, the blood must be much more oxygenated; there must be likewise a much greater quantity of chylous nutriment, and hence the organs of necessity more completely evolved at birth, and fitted to greater exertions. By this means it is that his pelvis is completely ossified when foaled, and many of the epiphyses of the bones likewise, which, in the human infant, remain cartilaginous for many months afterwards; and it is for this purpose, it is more than probable, that this very extensive attachment is permitted in the uterus of the mare.

stood. The *amnios* is a very fine but firm membrane immediately involving the fœtus, with the umbilical vessels ramifying upon its inner surface, and from which are separated a fluid within the cavity, in which the fœtus swims till birth: this is called *liquor amnii*. It varies in qualities and appearance in different animals; and was originally supposed to be swallowed by the fœtus, or absorbed by his skin for nutriment; but it has been lately more generally supposed to regard the preservation of the fœtus from pressure, and for lubrifying the parts of the mother: in the early months of gestation its proportional quantity is much greater than in the latter months.

The *umbilical cord*.—The fœtus becomes connected with the coats and parts surrounding it, not only by means of the fluid in which it swims, but by means of vessels which are passing from it to the expansion of the placenta: these vessels, together with the canal we have described, called urachus, are invested with coverings from the membranes, and some inner spongy gelatinous substances, and these united form a long rope of two or three feet or more in length, and an inch in diameter, which is called the *umbilical cord*, originating from the navel of the fœtus, and inserted into some part of the placenta. The vessels within this cord are two arteries and a vein, which are called umbilical; and it is by these that the communication is kept up between the foal and mother; for as these ramify throughout the placenta, and as the placenta unites intimately with the uterus, so it is evident a close union is kept up.

These are the parts that are particularly concerned in bringing the embryo into maturity, all which undergo great changes during pregnancy, both with regard to the fœtus, and with regard to each other. In the early periods of gestation, the coats or bags of the ovum form much its largest proportion; as gestation advances, the proportions become more equal; while, in the latter months, the fœtus is infinitely greater than the membranes. We have shewn how small a part the uterus formed when unimpregnated; it is surprising, therefore, how great must be its increase to contain such a quantity as it does in the latter months of gestation; but anatomy teaches us that it is not by a distention of its parts that it becomes increased, but by an actual growth and addition of them, from its additional vascularity; so that as it enlarges in size, it increases in thickness. The fundus appears the part that enlarges the most, so as to stretch far beyond the cornua; extending up to near the epigastrium, pushing the large intestines on each side, so that the pregnant uterus lays upon the abdominal muscles. In this state it continues to increase, till, at last, the distention becomes greater than the capacity; when its muscular fibres, powerfully assisted by the diaphragm and abdominal muscles, contract; by the joint action of which, the foal and its membranes become expelled. Parturition is not so difficult in quadrupeds as in the human; the human pelvis, from the situation, is necessarily much smaller, and the fœtus has to make a considerable curvature in its exit: but, in brutes, the

passage is direct, and the pelvis large; therefore there is less pain, and less occasion for a very muscular uterus. Nevertheless, difficult parturition, as well as false presentation, occur now and then in mares, cows, and ewes. In bitches, particularly those much confined, these evils are very common.

The Fœtal Colt.

The embryo of the future animal at first exists in an oviparous state; gradually the ovum becomes attached to the uterus, and then the rudiments of the embryo appear in the form of a spot: but it is some weeks after impregnation before any form can be distinctly marked; the whole is a mass without figure. The more material parts first appear, as the head, with the brain, and the organs of sense; then follow the heart, lungs, and abdominal viscera. During this state, though it has a life of its own, yet this life is very simple; for it may want brain, heart, and many of the other organs absolutely essential to the adult state: in this state its existence is nearly vegetative; it draws its supplies from the parent, by means of its circulation, but its organs are passive.

Fœtal circulation.—To describe the mode in which the blood proceeds, and in which it gives out nutrition in its course to the fœtal system, we must again recognise the placenta. From what has been said, it may be remembered, that this mass is formed of the true chorion and tunica decidua united together; and that, though both of these are intimately united into one body; yet that it is only by a contact of parts, without an inosculation of their mutual vessels: consequently, that they were to be still regarded as two portions, because two distinct circulations went on within them, and blood injected from one would not pass into the other; therefore, the part immediately connected with the uterus, and formed from the tunica decidua, is called the *maternal portion of the placenta*; while that half connected with it, and formed from the outer surface of the chorion, is called the *fœtal portion of the same placenta*. Into this part the umbilical arteries terminate; and it must be remarked, that the blood within them is dark and venous. They terminate not in the usual manner of arteries, by an exhaling outlet, and a returning vein; but the branches unite very freely with each other, and terminate wholly in returning veins; for if we pass injection by any one branch, it fills the arteries around, and likewise the veins throughout the system; but the maternal portion of the placenta is left uninjected. In the maternal portion, on the contrary, the arteries penetrate it from the uterus, and terminate in an exhalent orifice, and a returning vein. This exhalent orifice deposits a fluid of a chylous quality, and which becomes introduced into the blood of the fœtus; but whether this is effected by the medium of absorbents, or whether it is poured directly into the returning veins, does not appear altogether certain: but it is probable, that it is effected by absorbents, which, though they are not very evident, yet may exist; and, in some late injections, are actually said to have been found: and which is rendered

still farther probable, as madder given to a mare has been known to tinge the foal. By these means, therefore, the blood brought from the fœtus by the umbilical arteries, which is impure and venous, becomes changed, and by absorbing oxygen from the cells of the maternal portion, from being dark and venous, it becomes more florid and oxygenated; though not in an equal degree to that which takes place in the lungs in the adult state. It likewise gains an addition to its quantity from the chylous fluid it absorbs; and from these joint changes it becomes vivified and fitted to the support and evolution of the fœtus. Thus, therefore, the placenta forms the true fœtal lungs; in fact, it forms also the true fœtal stomach; and it may be said to be the organ that possesses the specific power of all the organs combined, while the organs themselves only enjoy the life fitted to their evolution, but not adapted to their specific action. As the blood of the fœtus derives its oxygen from the placenta, so it must be evident, according to the modern doctrines, that the vital heat of the fœtus is derived from this source. But as the oxygenation of the fœtal blood is not so complete as the adult, so the heat evolved may be less; less however is necessary to the fœtus, for it is surrounded by a high and uniform temperature. To continue the subject, the fœtal blood so changed is gathered up by the minute divisions of the veins of the fœtal portion of the placenta, which gradually unite to form one trunk.

The *umbilical vein* is this trunk, which passes in a spiral manner with the cord through the umbilicus, or navel, where it leaves the urachus and the umbilical arteries, and proceeds to gain the sinus of the vena portæ, into which it pours its contents to be by that means circulated with the blood of the abdominal viscera.

It is evident, that here a very wide difference exists between this subject and the human; in whom, and in all other animals that have been examined, except the ass, there is a considerable branch of the umbilical vein, that, by communicating with one of the branches of the hepatic veins, appears to intend, that part of the blood, shall purposely avoid this circuitous route: this peculiar communication is called *canalis venosus*. But in the horse, and his counterpart, the ass, the whole of the fœtal blood circulates through the liver, and which it is remarkable that the French anatomists were unacquainted with; for Bourgelat, La Fosse, and Vitet, all describe the canalis venosus as existing in this animal. It is therefore evident, that the fœtal circulation of the horse and ass differs from that of all other animals with whom we are acquainted. It becomes a very natural subject of inquiry, as to what may be the cause of this peculiarity; and which, by an attentive consideration of the foregoing remarks, will, perhaps, not be difficult to understand. We have shewn that in the fœtus, or unborn colt, the glands and other organs have only growth to perform; but they have no *specific action*, and as such they must be merely in a state of capacity: thus, therefore, they have need only of blood of such purity as is necessary and sufficient to the growth of parts, but not

to their specific action: for were the specific action to take place, that is, were the liver to secrete bile, and the kidneys urine, and so with the other glands, the destruction of the fœtus must be inevitable; we, therefore, find that nature has made some wonderful contrivances purposely to render the blood less pure, that the *specific action* of parts might be prevented.

As the maternal placenta only vivifies the fœtal blood in a secondary manner, that is, after it must have given out some of its oxygen; so, it is evident, the blood of the umbilical veins, when first received, is only in a comparative state of purity, and as it passes towards the heart in the human, and other animals, except the one we treat of, it mixes part of its blood with that circulating through the liver, by which it must be rendered still less pure: and here we can but admire the peculiar wisdom displayed; for as the liver is the only gland that secretes from venous blood, so, that its specific action might not be urged at this time, it is so arranged that it shall receive, at this period, purer blood than any other organ. Now, it being remembered, that as the placenta in the mare is attached to the whole surface of the uterus, there must consequently be a very great absorption of oxygen from this extensive attachment; so it does not, under this view, appear wonderful, that there should be a still farther contrivance to deteriorate it: and, therefore, as the blood in the umbilical vein in the fœtal colt is purer than that of any other animal, so there is no canalis venosus, that by this means it might be all under the necessity of passing through the liver, and thus become as equally deprived of its oxygen, as in those animals who have not this extensive attachment. Nor does this at all tend to destroy our former argument, that this large surface was for the purpose of taking up a greater quantity of nutritious principles; for it is more than probable, that one portion of the blood may be designed to perform the growth and evolution of parts, and another to keep up their specific action; and, probably, it is this latter part which is given out in its circulation through the liver.

From the liver the blood is passed into the vena cava, and from thence to the right auricle; but it does not from this pass into the right ventricle, as in the adult; but a part of it escapes through an opening in the septum of the heart, between the right and left auricles, at once into the left auricle, from whence it is prevented from returning by the eustachian valve. This opening, called the *foramen ovale*, closes up as soon as respiration takes place. The rest of the blood passes, as in the adult, into the right ventricle, and from thence into the pulmonary artery; but here, again, another great contrivance appears, to prevent the fœtal blood from going through the lungs, and which would be unnecessary, as these organs have only growth to perform, but no change on the blood to effect: hence, therefore, there is in the circulation at this early period, a communication between the pulmonary artery and the aorta, by means of an additional lateral trunk, called the *ductus arteriosus*;

through which the greater part of the blood escapes at once from the right to the left side, without the circuitous round of the lungs. As the fœtal blood is not so perfectly oxygenated as it is in the adult state, by the intervention of its own organs, therefore the round of circulation is shortened, and it is more quickly returned, so that what may be wanted in quality, is thus made up in frequency. Yet still some blood circulates through the lungs, and, besides which, the bronchial artery is considerable; so that the same ends are apparently kept in view here as in the liver; both are organs whose use is immediate and necessary at birth, therefore both must be completely evolved, and both must consequently receive an additional quantity of blood. That which circulates through the lungs is returned in the usual way into the left auricle, where it meets with what had escaped from the right side of the heart, through the foramen ovale, from whence it passes into the left ventricle, and from thence into the aorta, to join with that received by the ductus arteriosus. Here then the blood is reduced to the adult state, and is distributed over the body in the usual manner; but, at the bifurcation of the aorta, there are given off two considerable arteries.

The *umbilical arteries.*—The two arteries given off at the bifurcation of the aorta, are called umbilical: in the human, and, I believe, in most animals who are born indigent, these arteries originate from the internal iliacs; but, in the horse, and some other large animals, they arise as above: the reason of which may be, that the lower extremities might have a more considerable proportion of blood than usual, by which means they might be fully evolved at birth, and equal to bear the superincumbent weight, as well as to make considerable exertions. These arteries then pass down towards the bladder, one on each side, where they join the urachus, with which they are continued out of the abdomen by the umbilicus, and along the umbilical cord, to be ramified in the way we have described.

By these means, therefore, the colt is first conceived, and by these it is brought to maturity, and ushered into the world by the act of *foaling*. We have before taught, that the blood received an addition, both in quality and quantity. The organs for the first, are fitted to be brought into immediate action at birth, and the colt respires as perfectly the first hour as at any future period; but the addition to the quantity of the blood is brought about by parts which have not yet gained sufficient strength to enter into immediate and full action; they, therefore, have a food prepared for them, that contains nutriment in a high degree, already masticated, and partly digested and animalized: this food is the *milk* of the mare, and the same consent of parts that first made her feel œstrum, and propagate from the embraces of the male, produces this secretion; and this sympathy still remains, for she continues to secrete, and to regard her offspring as a part of herself; and thus she nurtures, rears, and protects it, till, from the complete evolution

of the organs of the offspring, it is fitted to perform all the parent acts, when, being able to counteract its own wants, it sympathizes only with itself; while the parent-mother's care being also no longer necessary, her secretion ceases, and she likewise sympathizes only with herself: her generative organs prepare anew for the same great work; for the mutual dependence being lost, she again feels œstrum; while her foal grazes, digests, and shifts for itself.

The *period of gestation* varies in different animals; in the larger kinds it is a process of much longer duration than in the smaller. In the elephant, and the whale, it occupies a great many months: in the mare eleven months; in the cow about nine months; in the sheep five months; in swine about 150 days; in dogs about 63 days; hares and rabbits bring forth about the thirtieth day. The Memoirs of the National Institute of France contain an interesting communication on this subject, by M. Tessier, whose observations are detailed as follows:—

I. *Cows.*

One hundred and sixty cows were observed.

14 calved from the 241st to the 266th day; that is, from 8 months and 1 day to 8 months and 26 days.
3 . . . . . on the 270th day.
50 . . . . . from the 270th to the 280th day.
68 . . . . . from the 280th to the 290th day.
20 . . . . . on the 300th day.
5 . . . . . on the 308th day.

160

Consequently there were 67 days between the two extremes.

II. *Mares.*

One hundred and two mares were observed.

3 foaled on the 311th day.
1 . . . . on the 314th day.
1 . . . . on the 325th day.
1 . . . . on the 326th day.
2 . . . . on the 330th day.
47 . . . . from the 340th to the 350th day.
25 . . . . from the 350th to the 360th day.
21 . . . . from the 360th to the 377th day.
1 . . . . on the 394th day.

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This gives a latitude in the time of gestation of 83 days; and the following observation may be made respecting cows and mares; namely, that more of the first brought forth before the completion of the ninth month, than of the second before that of the eleventh.

III. *Sows.*

Of these only sixteen were observed.

1 brought forth young, which lived, on the 109th day; that is, 3 months and 19 days.
10 . . . . . from the 110th to the 120th day.
3 . . . . . on the 121st day.
1 . . . . . on the 122d day.
1 . . . . . on the 123d day.

16

Consequently the difference between the two extremes was 14 days.

IV. *Rabbits.*

One hundred and thirty-nine were observed during the course of three years.

1 brought forth on the 26th day.
2 . . . . . on the 27th day.
3 . . . . . on the 28th day.
53 . . . . . on the 29th day.
50 . . . . . on the 30th day.
21 . . . . . on the 31st day.
9 . . . . . on the 33d day.

139

The difference between the two extremes in these animals was seven days.

In *Dogs*, I have observed the general period to be between the sixtieth and sixty-third day; but, in some instances, it has occurred as early as the fifty-eighth day, and, in others, has been protracted to the sixty-fifth: in two or three cases I have seen it prolonged to the seventieth day.

Sect. XVII.

THE STRUCTURE, FUNCTIONS, AND ECONOMY OF THE EXTREMITIES.

IN the human anatomy, it is usual to blend the description of the extremities with the other parts of the body; and we have, in general cases, accommodated ourselves to this mode: but as progression forms the most material of the functions of the horse, regarding his utility to mankind, so the most marked attention must be paid to these parts, whereby this progression is effected; and the more as they are found, from the life of art we subject the

animal to, particularly prone to disease; therefore the structure, functions, and economy of the extremities, become matters of peculiar import; and, as such, we shall treat of them separately.

Description of Plate VI.

This plate is intended merely to give an outline of the muscles of the superior parts of the fore and hinder extremities, as those of the thigh and shoulder.

Figure the First

Represents the muscles of the shoulder; *a*, trapezius; *b*, the common muscle; *c*, abductor longus humeri; *d*, abductor brevis humeri; *e*, postea spinatus; *f*, antea spinatus; *g*, postea spinatus minor; *h*, pectoralis minus; *i*, pectoralis magnus; *k*, serratus major; *l*, part of the fascialis cubiti; *m*, triangularis; *n*, biceps extensor cubiti; *o*, part of the biceps flexor cubiti; *p*, that part of the common muscle that is only described by some authors; *q*, rhomboideus minor; *r r*, the ligamentum colli, cervical ligament, or fix fax of the neck; *s*, extensor cubiti intermedii.

Figure the Second

Represents the muscles of the inside of the shoulder; *a*, subscapularis; *b*, flexor radialis anticus; *c*, flexor brachialis anticus; *d*, brachialis internus; *e*, biceps extensor cubiti; *f*, fascialis cubiti; *g*, latissimus dorsi; *h*, antea spinatus; *i*, triangularis; *k*, serratus major; *l*, rhomboideus major; *m*, coraco brachialis; *n*, adductor humeri; *o*, rhomboideus minor; *p*, pectoralis minor; *q*, insertion of the pectoralis magnus; *r*, insertion of the sterno brachialis; *s*, the fascia of the fascialis cubiti.

Figure the Third

Represents the outside of the buttock and thigh; *a a*, semi membranosus; *b*, biceps flexor cruris; *c*, *d*, flexor cruris posticus; *e*, gluteus minimus; *f*, gluteus maximus; *g*, tensor vaginæ femoris; *h*, vastus externus; *i*, the anus, with its sphincter.

Figure the Fourth.

Inside of the thigh; *a a*, triceps adductor femoris; *b*, gracilis; *c*, pectineus; *d*, psoas parvus; *e*, psoas magnus; *f*, iliacus internus; *g*, part of the tensor vaginæ femoris; *h*, sartorius; *i*, part of the rectus cruris; *k*, part of the vastus internus; *l*, part of the flexor cruris posticus; *m*, gastrocnemius.

THE ANTERIOR EXTREMITIES.

Description of Plate VII.

This plate represents two views of the fore leg, with the outer integuments removed, and the fascia taken off so as to bare the muscles: in both figures, the utmost care was taken to preserve the natural appearance, so that the pupil may place them before him as a reference when dissecting.

Figure the First

Represents a lateral, and rather front view of an off fore leg; *a*, extensor metacarpi magnum; *b*, its termination at the tuberosity of the canon; *c*, extensor longus pedis anticus; its fibres pass into the white band, at its outer part, which is its tendon; it proceeds down under the annular ligaments, and widens as it goes over the knee, where it gives off, in a peculiar manner, a little tendon which joins the

Plate 6.

Fig. 3.

Fig. 4.

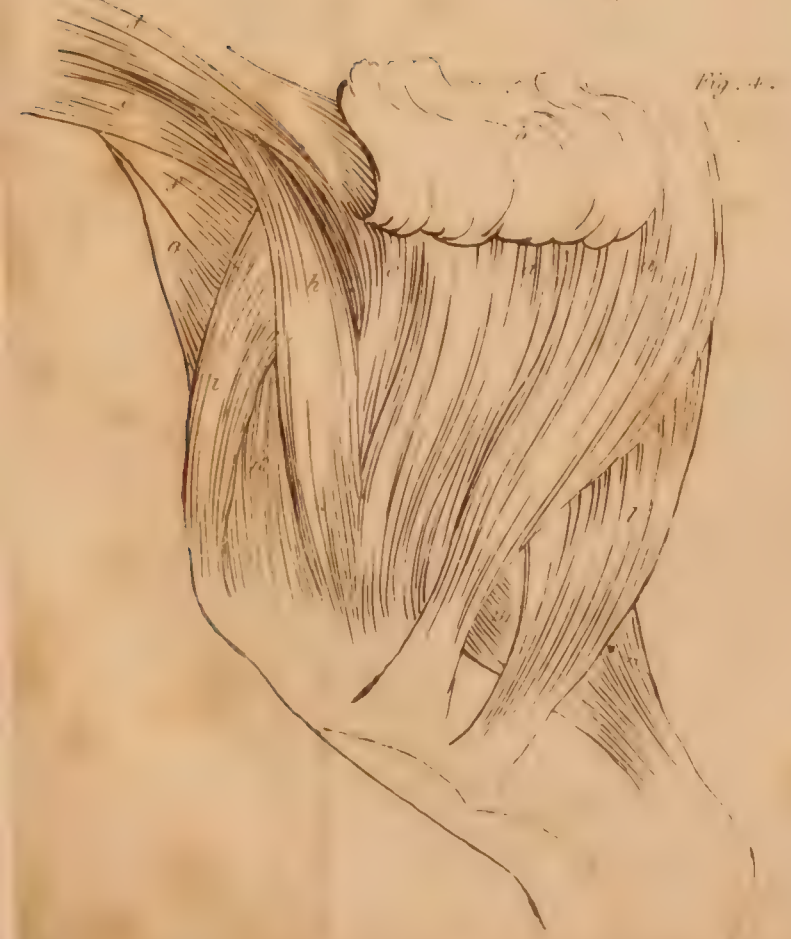


Fig. 1.

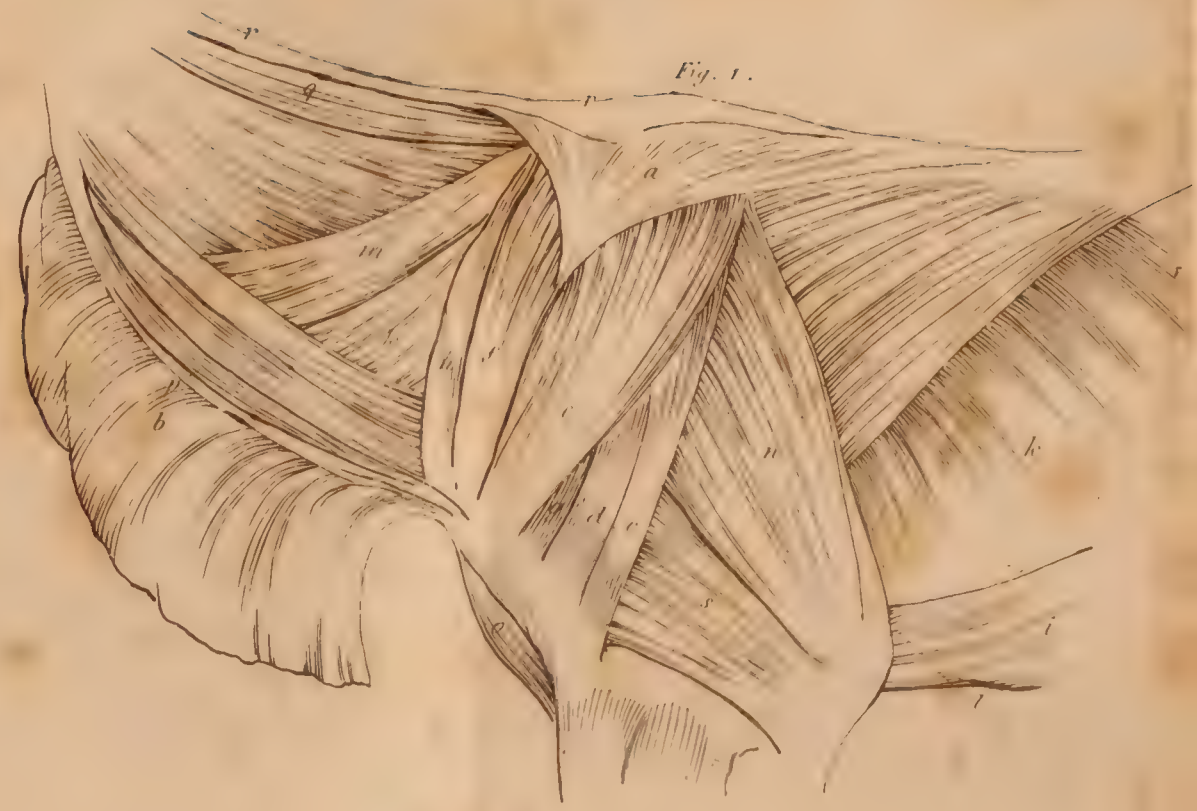
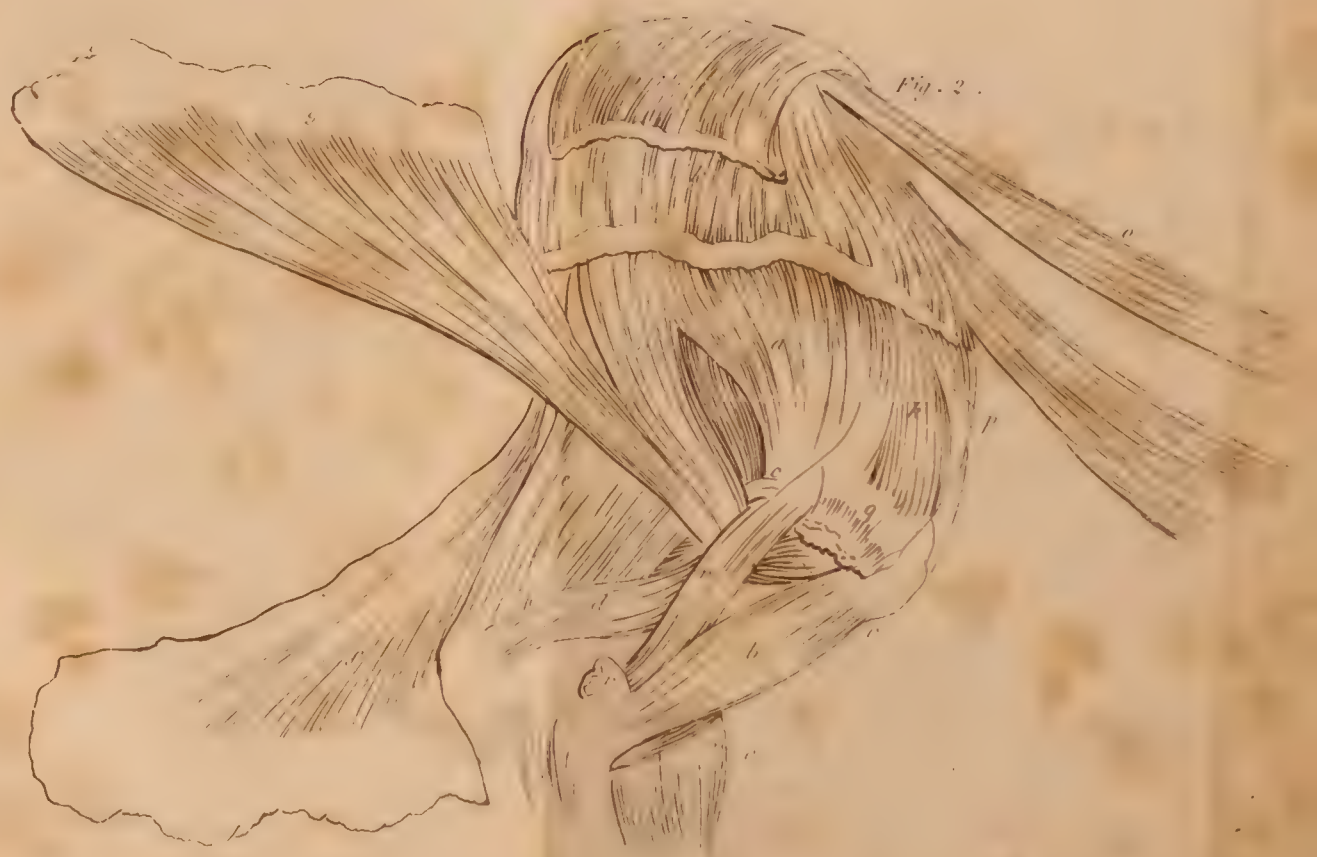


Fig. 2.



intermediate anterior ligament; *d*, the termination of the extensor muscle of the foot into the anterior and superior part of the coffin bone, first receiving the suspensory bifurcating ligament; *e*, extensor metacarpi radialis; at *f*, it passes obliquely round the knee, to be inserted into the inner side of the canon; *g*, flexor metacarpi externus; *h*, its partial insertion into the head of the outer small metacarpal bone; being afterwards continued over this part of the knee, to blend with the anterior ligaments; *k*, one head of the flexor pedis perforans anticus; *l*, its exit from under the tendinous expansion of the knee, invested by the perforatus tendon; *m*, its termination in the foot; *n*, part of the flexor perforatus anticus; *o*, its tendon investing the perforans, and continued through the ligaments of the fetlock; *p*, its insertion by two portions; one on each side of the bottom of the pastern, some fibres being continued on to the little pastern, or coronary bone; *q*, the point of the olecranon, or elbow; *r*, the head of the radius, from which is seen to arise the extensor metacarpi radialis: its tendon is continued down very small, and unites with the outer anterior ligament, under the annular, to be continued with it; *s*, the outer anterior ligament formed from an expansion of the flexor metacarpi externus, receiving the small tendon of the little extensor, and continued with it down to *t*, to be inserted into the head of the pastern; *u*, the intermediate anterior ligament receiving the tendon of the extensor of the foot, and continued with it to be fixed at *v*, in the same manner with the former.

1. The tibia; immediately below this is seen some lines which describe the capsular ligaments of the knee joint, arising from the inferior part of the tibia. 2. The loose floating edge of a very strong ligamentous or tendinous expansion, formed from a continuance of the fascia covering all the knee, and forming its annular ligaments: it is continued down over the back sinews, half way along the leg. 3. The annular ligaments: the portions cut out are thinner than the rest, and shew the tendons passing underneath, and the capsular ligaments of the knee joint. 4. The tendinous expansion of the knee proceeding down over the flexor tendons, after which it becomes loose and slight, but is continued on to the ligaments in front, and to the extensor tendon, and from thence to the inner metacarpal bone. 5. Its edge, where it is cut from the canon, which appears beyond it. 6. The outer metacarpal bone, having the tendinous expansion running down, adhering to it, and which at its bottom part is continued as a ligament on the pastern. 7. The suspensory bifurcating ligaments, forming a support to the sesamoids, and likewise to the fetlock; and passed on to the extensor tendons of the foot at 8.—9. Under the expansion of the flexor tendons and bifurcating ligaments are seen the ligaments of the pastern and coronet. 10. The expansion of the suspensory bifurcating ligament, passing around the ring of the perforatus. 11. The bursa mucosa that surrounds the tendon at this part; the dilatation of which forms windgalls.

Figure the Second.

a, Flexor metacarpi internus, is seen to run at its lower part under an annular ligament; *b*, flexor carpi cut off from its origin at *c*, to shew the muscles underneath: its posterior part passes within an annular ligament to its insertion; *d*, flexor pedis perforatus, or perforated muscle; *e*, *f*, *g*, three heads of the flexor pedis perforans, or perforating muscle: its tendons enter within the annular ligament, under which they are seen passing separately; *h*, extensor metacarpi magnus; *i*, part of the biceps flexor cubiti; *k*, part of the extensor cubiti intermedii; *l*, part of the biceps extensor cubiti; *m*, the humeral vein forming its branches; *n*, the branch forming the plate vein; *o*, the humeral artery; *p*, the three branches of the humeral nerves; *q*, the inner condyle of the radius; *r*, a ligament running from the posterior part of the radius, into the tendon of this head of the flexor of the foot; *s*, another ligament running into each side of the perforated tendon, arising immediately at the origin of the bifurcating ligaments; *t*, the continuation of the perforated tendon, at which part it is completely perforated, and forms a perfect ring for the perforans; *u*, the termination of the perforated tendon; *v*, the flexor of the foot, or perforating tendon; *w*, its termination; *x*, bifurcating ligaments; *y*, their junction with the extensor of the foot; *z*, the inner metacarpal bone. 1. The tendinous expansion of the knee continued down with the bone. 2. The articulation of the radius, with the first row of the carpus: it is shewn

covered with the tendinous expansion which is removed at the edge. 3, 4. The canon. 5. The tibia. 6. The vein that furnishes the foot. 7. The ligaments of the pastern: × The axillary glands. 9. The expansion of the bifurcating ligaments. 10. The situation in which splents are frequently formed. 11. The situation of windgalls, originating from a dilatation of the mucous capsules of these parts.

It may be observed, that in the first figure, half the hoof has been removed, to shew the laminated substance of the foot; and in the second figure, the horny and fleshy soles have been removed, to shew the insertion of the flexor tendon: it should be remarked also, that the lateral cartilage has been taken off with the hoof.

DESCRIPTION OF THE ANTERIOR EXTREMITIES.

In the myology of the trunk I followed Bourgelat's nomenclature, as being the most correct extant: had I been perfectly aware of the one used at the Veterinary College, I would have introduced that in preference to any other; from my wish to simplify the art as much as possible, and being anxious to throw no obstruction in the way of the college pupil by multiplying his references: but as I am not perfectly aware of the nomenclature adopted there, and as also, if I am rightly informed, the terms there used vary on each description, so I have forborne to give, as in the former edition, Mr. C.'s presumed names of muscles. I have, therefore, for reasons stated in the Myology, used a nomenclature for the muscles of the extremities formed by myself, as nearly corresponding with that in use in the human subject as the circumstances will admit.

Muscles of the Shoulder.

Trapezius.—According to Mr. Stubb's description, this is an immense muscle; but though the division of it appears sufficiently definite, yet, by some mistake, he has blended it with part of the common muscle, or levator humeri, and the cutaneous. It arises posteriorly from several of the spinous processes of the dorsal vertebræ, and blends with the panniculus carnosus, and latissimus dorsi: anteriorly it arises from the ligamentum colli, or cervical ligament, and then runs down in an angular form to be inserted tendinous into the prominent part of the spine of the scapula (*vide Plate* VI, *Fig.* 1, *a*). This muscle is very useful in drawing the scapula upwards and backwards; and, therefore, must be a powerful assistant in progression: it appears to form the triangular of La Fosse, and the cutaneous of Bourgelat. In the horse, there exists only what is called in man its ascending portion; and it is from a too close straining of the analogy, and a want of sufficient independency in the Hippopotamist, that so much confusion has arisen in the description of this and other muscles.

Rhomboideus major.—This muscle arises, and continues fleshy, from the 3d, 4th, 5th, and 6th spinous processes of the dorsal vertebræ, and is inserted into the internal surface of the cartilage, at the base of the scapula, through its whole extent. (*Vide l, Fig.* 2,

Plate VI.) It evidently draws the shoulder upwards, and attaches it to the chest. Releveur propre—*Bourgelat.*

Rhomboideus minor.—The little rhomboid arises under the cervical ligament, to which it is attached nearly its whole length, and is inserted into the anterior edge of the cartilage at the base of the scapula, rather internally: it is so blended with the former, as to make its insertion with difficulty separable, and which has occasioned it, with some propriety, to be described as a biceps muscle. (See *q*, *Fig.* 1, *and o*, *Fig.* 2, *Plate* VI.) It has been also called the levator scapuli; as when the neck is fixed, it must tend to elevate and draw the superior part of its base forward.

Pectoralis minor, vel depressor scapuli, is a long fleshy muscle immediately in front of the scapula, arising from the lateral part of the sternum, under the origin of the sterno brachialis, and inserted into the anterior superior part of the scapula. (*Vide h*, *Fig.* 1, *p*, *Fig.* 2, *Plate* VI.) Its use is to depress this bone.

Triangularis.—This muscle Bourgelat considers as part of the serratus major; and it is so connected with it, as to be perhaps as properly so considered, as distinct: nevertheless, as there is something like a line of division between them, I have chosen this mode. It arises from the transverse processes of the third, fourth, and fifth cervical vertebræ, and inserts itself above the little pectoral, at the superior and anterior edge of the blade bone. (*Vide m*, *Fig.* 1, *Plate* VI.) It draws this bone forwards.

Serratus major anticus, or grand dentata, is a very extensive and important muscle, and arises by fleshy digitations from all the true ribs, covering all that part of the thorax comprehended in this space, and interlacing with the digitated portions of the obliquus abdominis: it unites very intimately with the intercostals likewise, and is continued forward on the neck as far as the transverse process of the fifth cervical vertebra, uniting with the triangular. All this extensive expansion is determined towards the under surface of the scapula like radii to a centre, or like the sticks of a fan, and is inserted into the whole of the upper and internal surface of that bone, below the great rhomboid; one small slip being particularly inserted into the posterior edge of the cartilage. Intermixed with its muscular fibres are some strong tendinous portions towards its insertion, and which Bourgelat mistook for ligaments peculiar to the articulation of the scapula with the chest. It is, however, principally by means of this muscle, that the shoulder is attached to the chest; and while other bones are kept in their situation, by opposition of bone to bone with appropriate ligaments, the scapula has only muscular attachment; hence the extensive origin and insertion of this muscle. When the whole of the serratus is in action, it must tend strongly to draw the shoulder blade to the chest, and in some measure to pull it downward, and hence to elevate the body upon the leg as upon a pillar; therefore, it is the great sustaining muscle of the fore-part of the machine, supporting that weight before, that the pelvis does behind. It is likewise a very powerful assistant muscle in inspira-

tion, by enlarging the chest when the extremities are the fixed point; and which appears to be the reason why, in inflammation of the lungs, a horse seldom lays down; because the fore extremities being fixed, the chest can be more enlarged by this muscle: and hence likewise in exercise, when this muscle is wanted for progression, with other assistant muscles, a difficulty of breathing is experienced, and it is done quickly, to make up by frequency what is wanted in strength. (*Vide k k, Fig.* 1 *and* 2, *Plate* VI.)

Muscles of the Humerus, or Arm.

The *antea spinatus* here, is the supra spinatus of the human, and occupies the whole antea spinatus fossa of the scapula; as it proceeds it becomes thicker, and towards its insertion bifurcates into two portions, admitting the tendon of the flexor cubiti between them: these two tendons are inserted into the two anterior tuberosities of the humerus. From this division, La Fosse has been induced to describe it as two distinct muscles (*vide f, Fig.* 1, *Plate* VI): it powerfully extends the arm, and carries it forward.

Postea spinatus major, which is the infra spinatus of the human, has been described as a biceps muscle. It fills up nearly the whole of the postea spinatus fossa; arising thin, but becoming thicker, it is inserted into the lateral external and superior head of the humerus, by which it can draw the arm bone outward and upward. (*Vide e, Fig.* 1, *Plate* VI.)

Postea spinatus minor is a small muscle immediately under and behind the former, arising from the posterior part of the scapula, near where the spine ends, and is inserted into the upper small tuberosity of the humerus. In its action it assists the former. (*Vide g, Fig.* 1, *Plate* VI.)

Extensor ligamenti vel capsularis is a small muscle, apparently distinct from the former, arising from the coracoid process, and inserted over the capsular ligament; by its action preventing it from being pinched.

Latissimus dorsi is a large thin muscle arising by aponeurosis, from all the dorsal muscles almost to the ilium, and from the spinous processes of the dorsal and lumbar vertebræ; becoming muscular, it is continued over the ribs, intimately connected with the panniculus carnosus, as well as with the trapezius: contracting, and being continued downwards under the scapula, it is inserted into the internal superior tuberosity of the humerus, either connected with, or giving a tendinous expansion to unite with the fascia of the muscles of the radius. It draws the humerus obliquely backwards, and assists the trapezius in elevating the scapula. (*Vide g, Fig.* 2, *Plate* VI.)

The *common muscle*, or levator humeri, is one common to the head, neck, and arm, and is variously described in almost every author: by some being confounded with the cutaneous muscle of the neck, and by others with other muscles. Mr. Stubbs calls it latissimus colli; Bourgelat and La Fosse confound it with the expansion proper to this part, with which it is in fact so intermixed, that it is

not easy to describe the separate divisions and characters. It is a muscle peculiar to quadrupeds. One origin is from the mastoid process of the occipital bone, and partly also from the temporal bone, proceeding towards the inferior and anterior part of the scapula; another head arises from the cervical ligament, and some of the posterior transverse neck processes: these two passing down under the cutaneous muscle, the first head attached to the anterior of these processes, as the last is to the latter of them, it unites and inserts itself into the middle and anterior part of the os humeri. (*Vide p, Fig.* 1, *Plate* VI.) In the plate, the cutaneous muscle adheres with the common; and, in fact, authors are so much divided about these two muscles, that none have yet agreed on the portions belonging to each: it appears that that which is described by them as the cutaneous, is but the portion of this common muscle that arises from the cervical ligament, and I have made the same division in fact; for my cutaneous muscle, described in the Myology of the neck, appears but a portion of this; but as this thin expansion can influence and corrugate the skin of the neck, perhaps it might be not altogether improper to consider that part of it as cutaneous; which, arising from the cervical ligament, lays over the whole muscles of the neck, meets its fellow before the trachea, and is connected by aponeurosis to the spine of the scapula, extending down to unite in the insertion pointed out. From the sterno brachialis being united to a portion of the common muscle, Bourgelat has been led to consider the former as a part only of the latter. (*Vide p, b, Fig.* 1, *Plate* VI.) Its use is to elevate the arm, and, when the extremity is fixed, it becomes a muscle of the head and neck, and bends them laterally.

Subscapularis.—It fills up all the subscapulary hollow not occupied by the serratus and rhomboid, but does not extend quite to the anterior part of the shoulder blade, which part is occupied by the antea spinatus (*vide h, Fig.* 2, *Plate* VI): it is inserted into the inner head of the os humeri. It depresses the scapula, slightly adducts and rotates the humerus, strengthens the articulation, and prevents the capsular ligament from being pinched. (*Vide a, Fig.* 2, *Plate* VI.)

Adductor humeri, is a muscle arising from the posterior and superior edge of the scapula, attached to the former, but sufficiently distinct to merit a particular name: it is the teres major of the human, and is inserted internally into the humerus some way below its head. (*Vide n, Fig.* 2, *Plate* VI.) It depresses the shoulder, rotates the humerus, and draws it backwards.

Flexor brachialis anticus arises from the lower part of the scapula near the articulation, and is inserted into the humerus at its upper and outer part, so as to flex and rotate it in action.

Pectoralis magnus arises from the posterior half of the sternum, and from the cartilages of the six last true ribs; is connected with the panniculus carnosus, and the aponeurosis of the obliquus; and is inserted into the head of the humerus internally, and slightly into

the outer and anterior part of the apex of the scapula. It draws the humerus downwards and backwards. It is cut off in the plate, but its insertion is marked by the letter *g*, *Plate* VI.

Sterno brachialis, I have so named, on account of its situation. Bourgelat considers it, improperly, as part of the common muscle: it is divided into two portions, which arise from the anterior part of the sternum, and are continued over the humerus, one to be inserted into the lower and inner part of that bone, and the other by an expansion over the muscles of the radius: both must powerfully adduct the arm. It is removed in *Fig.* 2, *Plate* VI, but its insertion is likewise marked (*vide r*).

Coraco brachialis is the omo brachialis of Bourgelat; arising from the coracoid process of the scapula, and is inserted, not into the middle of the humerus, as he describes, but towards the lower head anteriorly. (*Vide n*, *Fig.* 2, *Plate* VI.) It draws the humerus upwards and inwards, and must prove an adductor.

Abductor longus humeri forms the human teres minor, arising near the teres major, towards the superior part of the posterior costa of the scapula: passing along the hinder edge of the next muscle, it is inserted into the external tuberosity, at the upper part of the humerus. (*Vide c*, *Fig.* 1, *Plate* VI.) It rolls that bone outwards, draws it from the chest, and elevates it.

Abductor brevis humeri.—This muscle arises from the posterior edge of the scapula below the preceding, and is inserted between that and the subscapularis muscle: it assists the former in its abduction of the arm.

Muscles of the Fore-arm.

Flexor radialis anticus arises tendinous from the coracoid process of the scapula, and runs between the divided portions of the antea spinatus muscle: as it passes over the articulation of the scapula with the arm, it widens and hardens into a substance that represents a patella, and becomes of the same use to this joint that the patella is of to the stifle; this enlarged part is also invested with a particular ligament, and contains synovia: the tendon is then continued between the two anterior eminences of the humerus, from whence it becomes fleshy, having a central line of division, and a strong tendinous or fascial covering, and is finally inserted into the anterior and superior part of the head of the radius, towards the inner side, with the brachialis obliquus. (*Vide b*, *Fig.* 2, *Plate* VI.) This forms the principal flexor of the fore-arm; and it appears probable, that a dislocation of this tendon, from a violent blow of the shoulder, or arm at its point, forms what is termed a dislocated shoulder, or shoulder slip: for a real dislocation of the humerus from the scapula seldom if ever happens.

Brachialis obliquus, by Bourgelat, is called the short flexor, as the foregoing muscle is by him termed the long flexor; but as, when deprived of its obliquity, it would be the longest of the two, it is evident this term is a very improper one. It arises from around the

humerus immediately below its head; passes obliquely over the body of the bone, through the extensor intermedii, or rather through an interval left by its attachment, and is inserted into the superior part of the radius rather internally with the preceding. It is a flexor muscle, and can produce a small degree of lateral motion. (*Vide o, o, Fig. 2, Plate* VI.)

Fascialis cubiti is the muscle which Bourgelat calls the long extensor. It rises very thin by an aponeurotic expansion from the posterior costa of the scapula attached to the biceps; it passes down by a small fleshy belly till it arrives at the inner part of the olecranon, when its fibres expand into some breadth; the fleshy part inserts itself on the inner side of the olecranon, but the aponeurosis is continued over the fascia of the inside of the fore-arm: its principal use appears to be to keep this fascia tense, not only that it might prevent it from being pinched, but that it might strengthen the muscles in their action. (*Vide l, Fig.* 1, and *f, Fig.* 2, *Plate* VI.)

Biceps extensor cubiti is a very powerful muscle, and forms the large extensor of Bourgelat, arising by two portions from the posterior edge of the scapula, forming a large fleshy mass, which fills up the angle between the bladebone and olecranon, and inserts itself into the outer and upper part of the latter of these bones. (*Vide n, Fig.* 1, and *e, Fig.* 2, *Plate* VI.) It is a very powerful extensor of the fore-arm.

Extensor cubiti intermedii.—What I have so named, Bourgelat has called the short extensor, and which arises from the outer head, neck, and some part of the body of the humerus, passes down the outer edge, leaving an interval where the brachialis obliquus passes over the bone; it then continues attached to the bone, and inserts itself into the lateral and outer part of the olecranon: that portion of it that occupies the inferior and posterior part of the humerus, and the cavity for the reception of the olecranon, has been described as the little extensor of Bourgelat, but it appears not to deserve any particular division.

Brachialis internus forms the *moyen extenseur* of Bourgelat, and arises from below the head of the humerus internally: in the human it arises from the external condyle of this bone, and is inserted into the internal surface of the olecranon. It strengthens the elbow, extends the fore-arm, and is an antagonist to the oblique brachial. (*Vide d, Fig.* 2, *Plate* VI.)

Muscles of the Canon.

Extensor metacarpi magnum forms the right anterior extensor of Bourgelat, and arises fleshy from the tuberosity and external head of the humerus, and from the body of the bone half its length; its fibres are directed into an anterior tendon which takes them in, in a half pennated form: this tendon being formed towards the lower part of the radius, it here passes through a groove under the tendon of the next muscle to be inserted into the anterior and superior part

of the head of the canon or large metacarpal bone. (*Vide a, Fig.* 1, *Plate* VII.) This muscle straightens the knee and extends the canon.

Extensor metacarpi radialis is the oblique extensor of Bourgelat, arising from the lateral part of the radius externally; its fibres pass over the bone anteriorly, and contract into a tendon which proceeds over that of the former muscle, and inserts itself into the inner head of the canon, and into the head of the small internal metacarpal bone. (*Vide e, Fig.* 1, *Plate* VI.) This muscle assists in the extension of the metacarpus; but its principal use is exerted upon the ligaments of the knee, which it keeps firm and from being pinched.

Flexor metacarpi externus.—The flexor muscles of the extremities of the horse, it may be remarked, are more complex than the extensors. The muscle in question arises from the posterior part of the external condyle of the humerus, and is inserted in part into the pisiform bone, from whence it has been named pisiformis externus; but it appears also to be continued onwards to be inserted into the external small metacarpal bone, and into the ligaments surrounding these parts; and it must be remarked, that these ligaments are so very complex and numerous, and the metacarpal muscles, as well flexors as extensors, are so blended with them; that it is hardly possible to give any of them a determinate insertion. This muscle can act very strongly as a flexor by its advantageous attachment to the pisiform bone, being thereby removed far from the centre of motion. Also by a very peculiar connexion it has with the extending anterior ligaments of the pastern, it appears to be so continued into these as apparently to become both a flexor and an extensor (*vide s, Fig.* 1, *Plate* VII); but it will be found, on examination, that by the tightness with which it is bound down to its insertions, it cannot act very strongly on these ligaments, and what action it has, is really favourable to flexion; for it pulls the tendons influencing these ligaments out of the line of their insertion, and consequently must weaken their action, by which it proves an antagonist to them. (*Vide g, h, Fig.* 1, *Plate* VII.) This muscle has been described by the name of extensor parvus, I suppose from this peculiar attachment to the extending ligaments; but from the reasons before given, I think it ought to be considered as a flexor. By Bourgelat it is the external extensor.

Flexor metacarpi internus arises from the posterior part of the internal condyle of the humerus, and is a long thin fleshy muscle, which passes down under an annular ligament peculiar to it, and is inserted into the posterior portion of the inner head of the canon. It is a flexor to the metacarpus (*vide a, Fig.* 2, *Plate* VII), and forms the internal flexor of Bourgelat.

Flexor carpi.—I at first proposed calling this Flexor metacarpi medii; but as I could not trace it in any instance, farther than the carpus, I considered the former as the most proper: by Bourgelat it is called the oblique flexor. It arises near the former, and, passing obliquely across the muscles at the posterior part of the radius, it

inserts itself into the pisiform bone, and hence must prove a forcible flexor to the knee. (*Vide b, c, Fig.* 2, *Plate* VII.)

The *interossii muscles* are not always present, but when they are, they usually arise by two small fleshy bodies in the groove formed by the canon and the two small metacarpal bones, or a little below the suspensory bifurcating ligament, and run down two or three inches, to be inserted by a joint tendon into the internal side of the flexor muscles of the foot. In one subject that I examined, they existed before and not behind; in others, I sometimes found them both before and behind; and in some not at all.

Muscles of the Pastern and Foot.

Extensor longus pedis anticus.—This forms the anterior extensor of Bourgelat, and the extensor digitorum communis of Stubbs, from its resemblance to that muscle in man; and arises fleshy, in part from the external and lower head of the humerus, and in part from the external and superior portion of the radius, passing over the extensor metacarpi radialis, and being semipennated like the extensor metacarpi magnum: towards the lower part of the fore-arm it becomes wholly tendinous, proceeding down in front in a firm cord to the knee, where it is received under an annular ligament, which firmly binds it between two prominences in the carpus. As it passes over this joint its tendon expands (see *Fig.* 1, *Plate* VII), and becomes very smooth, by which wise contrivance the effects of friction are prevented; and by not being raised up into a round cord, it is less liable to accidents. As it runs under the annular ligament of the knee, it detaches in a very peculiar manner a small tendon that unites with the outer slip of the anterior ligaments by an expansion of cellular substance. At the pastern joint, the same enlargement of its surface takes place; at the inferior part of which it widens and receives the lateral expansions of the suspensory ligaments (*vide Fig.* 1), connecting itself very firmly with the lower head of the great pastern, and the upper head of the small; it is finally inserted into the anterior eminence of the coffin bone, to the joint of which, and to that of the pastern, it anteriorly performs the office of a capsular ligament; for on raising it from these parts, the cavity of the joint is always exposed. (*Vide c, d, Fig.* 1, *Plate* VII.) This muscle is an antagonist to the flexors, and acts on the knee, canon, pastern, and foot; straightening all these parts, when the flexors have elevated the limb.

Extensor lateralis pedis is both a muscle of the pastern and foot; but appears rather more appropriate to the pastern, and arises from the outer head of the radius: it becomes soon tendinous, and passes down through an annular ligament on the anterior and rather external part of the knee; from whence it passes obliquely backward to unite itself with the lateral slip of the anterior ligaments, with which it is continued, and with them is inserted into the pastern, sending an expansion that passes on to the ligaments of the foot.

(*Vide r, f, t, Fig.* 1.) This small peculiar muscle is an assistant extensor.

Flexor pedis perforatus anticus.—The perforatus and perforans have been considered and described as one muscle with several heads; but though some few of their fibres intermix, yet they are evidently distinct muscles. The perforatus arises from the posterior and lower part of the internal condyle of the humerus, between the heads of the next muscle, and descends along with these heads, with some of which it blends its muscular fibres, and becoming tendinous at the same part with them, it enters the ligamentous arch formed from the pisiform bone and neighbouring parts. It here first spreads to encase the united tendons of the perforans; but at this part the encased and encasing tendons are not united by cellular substance, but are very smooth; and though one lays within the other, there is mucus between. Within this arch, these tendons are firmly bound down between the heads of the small metacarpal bones, by ligamentous fibres; and between them and the surface they pass over in this arch, a true cavity exists, which contains synovia; so that cutting the tendon through here would have all the effect of opening a joint. By its being so firmly and closely connected to the bones, its strong contractions are prevented from rupturing or lacerating the surrounding parts. As this tendon passes below the knee encasing the perforans tendon, it receives a peculiar ligamentous substance which arises near the origin of the elastic bifurcating ligament, and which substance divides, one portion inserting itself into one side of this tendon, and the other portion into the other; by which means both tendons are more firmly connected to the bones, and kept in their proper line of action: they are likewise considerably supported by this means. (*Vide s, Fig.* 2.) The perforatus tendon now passing down, encasing the other at its posterior part, and united to it by a cellular substance, near the fetlock, it first enlarges, and, when opposite the sessamoids, it becomes a complete ring. (*Vide t, Fig.* 2, *Plate* VII.) This exhibits a most wise provision; for as this is a most prominent part, purposely made so by nature, to throw the tendons farther from the centre of motion, which are here peculiarly exposed to accident; so without this admirable contrivance they might become dislocated from each other. The joint tendons are held in this situation by an expansion of the suspensory ligaments (*vide* 10, *Fig.* 1, 9, *Fig.* 2, *Plate* VII) and by fibres from the integuments, which over this part are very thick; and lower down by an expansion of the ligaments of the pastern (*vide* 9, *Fig.* 1 *and* 7, *Fig.* 2, *Plate* VII): so at this part the perforans is inclosed with a double theca. The perforatus tendon now passing towards the heels, bifurcates into two portions (*vide p, Fig.* 1, *u, Fig.* 2, *Plate* VII), which are inserted into the large and small pastern bones, and blend with the ligaments from these parts.

Flexor pedis perforans anticus.—Though some of the fibres of this blend with the last described, yet it is evidently of itself a muscle;

and arises by two heads distinct, and two heads less distinct; one of which originates from the posterior part of the ulna (*vide g, Fig.* 2, *Plate* VII); two others, in some measure blended together (*vide e, f, Fig.* 2), arise from the internal and posterior inferior portion of the humerus; and a fourth still more indistinct, appearing like a collection of fibres belonging to one of the former, arises under these, rather posteriorly: these portions pass down fleshy to near the knee, where the most central receives a peculiar ligament from the inner edge of the tibia (*vide r, Fig.* 2), the use of which must be to bind it more closely down in its action. As these heads enter the arch formed by the ligaments from the pisiform bone, they unite to form one strong tendon, which is received into the perforatus tendon; and does not wholly surround it, but embraces all its posterior part (*vide l, Fig.* 1, *v, Fig.* 2): in the human the perforatus forms a division merely to let the perforans tendons through. As it passes the ligamentary arch behind the knee, it is firmly bound down to the bones as we have shewn, by which it not only can operate in the flexion of this part, but its strong action is also prevented from lacerating any of the surrounding substances: at this part there is between the perforatus tendon and its own, synovia, and likewise between the pisiform bone and this, by which motion is assisted, and the effects of friction prevented: but between the other parts of this and the perforatus tendon, except at the ring of the fetlock, there is connecting cellular membrane. Proceeding from under the arch of the knee, and down the canon, invested at its posterior part in the way we have mentioned, it passes between the divided portions of the ligament described with the last muscle, and, continuing down the canon, at the fetlock it becomes entirely surrounded by the perforatus, which at this part forms itself into a complete ring, as before noticed, to prevent the possibility of a dislocation between the two tendons at this exposed part. (*Vide* 10, *Fig.* 1, *t, g, Fig.* 2.) At the heels the perforatus leaves the perforans, and is now continued alone, to be inserted in an expanded portion in the posterior part of the vaulted arch of the coffin bone. (*Vide Fig.* 2, *Plate* VII, and *f, f, Fig.* 1, *Plate* IX.) These muscles, it is evident, are most important, and bend the knee, pasterns, and foot.

Ligaments of the Anterior Extremities.

The bones of these parts have been before particularly described in the Osteology; and the ligaments immediately connecting them, have been treated of likewise; but there are others connected with the muscles and integuments of these parts we have yet to describe. The muscles of the arm and fore-arm are covered by a *tendinous theca*, which forms a sheath to each of them individually, and is likewise reflected over the whole of them generally; so that on removing the integuments one plain surface is seen, and the risings and depressions of the muscles are by this means hardly visible. Nature has also wisely made the integuments, or skin of the extremities,

very strong and dense, particularly over the joints, forming a guard to them: this skin is thicker at the posterior part of the leg than at the anterior, and is much more firmly attached to some parts than to others: it adheres not only by the general cellular membrane, but by ligamentous fibres between it and the parts it covers; but these do not exist generally over the whole, but only in particular places, as the fetlocks, and most of the lower parts of the leg, as well as the posterior parts of these both above and below.

Over all the extremity also, but particularly over the knee, canon, and fetlocks, is spread a very firm dense cellular membrane, that may be raised in layers. It forms a strong investing covering to the whole; some portions of which are loose, and others attached to the ligaments below; so that it is extremely difficult in raising it, to ascertain justly what is investing cellular substance, what is fascia, or aponeurotic expansion, and what is appropriate ligament. When the outer and more loose layers of this general membrane have been removed, there appears over the muscles of the arm and fore-arm, a general fascia formed from extensions of the muscles of these parts; which seems either to end in, or unite with, a general ligamentous expansion that covers the whole of the knee, and inferior part of the radius, as well as the superior part of the canon: and is firmly bound down to the outer edge of the radius. (*Vide z, Fig.* 1, *Plate* VII.) It appears continued around over the back of the knee, and over the pisiform bone, to form the ligamentous arch, existing there for the purpose of binding down the tendons in their action: these densely united expansions likewise form the general annular ligament (*vide* 3, *f, Fig.* 1): other reflections of it, and of the immediate portions from one bone to the other, form also the particular annular ligaments, of which almost every tendon has one or more appropriate to it. From the posterior part of the knee, where this general annular ligament is the thickest, it is continued down thus dense and firm rather more than a third of its length (*vide* 4, *Fig.* 1, and 1, *Fig.* 2), by which it firmly fastens the flexor tendons. It is then carried round the fore part of the canon, firmly attached from one small metacarpal to the other, in its passage becoming attached to the anterior ligaments, and is carried in front down as low as the pastern, though behind it is continued no farther than where we described it; or at least the more tensely stretched portion, for there is a looser part still carried down behind as well as before. In *Fig.* 1, at 5, this anterior portion is seen, cut from the inner edge of the extensor longus, where it passed over, to be reflected on the inner metacarpal bone as described, and as may be seen in *Fig.* 2, between *x* and *z*.

This ligamentous expansion is wisely not continued lower posteriorly, or it would have impeded the motions of the tendons, by increasing the friction; but anteriorly, it cannot have this effect; on the contrary, thus far it strongly assists the parts. That, if continued lower, it would impede the motions, is very evident; for even as it is, when it is bound too closely to the bones, as is some-

times the case, these tendons then act disadvantageously: such a horse is said to be tied in under the knee, and these horses are always found to be easily strained; for they have not only greater resistance from the friction of the part to overcome; but the tendons, by not being so far removed from the centre of motion, require a much greater force to overcome even the common opposition to the flexion of the parts. It would appear, that this might probably be remedied by dividing this ligamentous expansion some way up, by means of a groove and a bistory: it would at least be worth the trial, as, if carefully performed, it is more than probable no ill effects would ensue: but it is evident that the ligament only should be divided: if too deeply or injudiciously done, it might have the effect of opening a joint.

The *ligaments of the extremities* are curious and complex; for besides this general one reflected over the knee and metacarpus, there are two *anterior ligaments of the canon*, which appear composed of a layer of the general annular ligament, of a particular one sent off from the pisiform bone, and of two tendinous laminæ, one belonging to the lateral extensor, and the other given off from the long extensor. (*Vide s, u, Fig.* 1, *Plate* VII.) These ligaments are an outer and an inner, but run down nearly together, obliquely from the outer side of the knee, to the anterior part of the canon, and insert themselves into the pastern, having an expansion continued on to the lesser pastern and foot. (*Vide t, v, Fig.* 1.) The tendons assisting to form these do not so closely unite with the ligaments, but that the distinct portions may be traced down all the way; nor do these ligaments unite with each other, but are continued separate with an intermediate portion of the general investing cellular substance between them.

At the posterior part of the canon, are two very peculiar portions, which have usually been called the lateral; but they would be more properly termed *elastic bifurcating ligaments*, or *suspensory*. They are placed in the hollow formed at the posterior part of the large metacarpal bone, or canon, by means of the two small metacarpals (*vide* 7, *Fig.* 1, *x*, *Fig.* 2), and originate near the head of this groove; that is, near the superior head of the canon, to which they are firmly attached, as well as to the small metacarpal bones: they are then continued within the groove, but unattached to the bones, down the canon, where they appear, on close examination, to be divided into two portions, by a hollow on their inner part, that bisects them, and in which hollow sometimés a blood vessel runs down to the pastern. These ligaments have the peculiarity of being elastic, and, except the cervical, there are but few instances of ligamentary elasticity in the body. As they approach the pastern, they bifurcate into two portions (*vide x, Fig.* 2): these branches are inserted into the sessamoids, and give each a continuation of their substance, expanded and passing obliquely over the body of the pastern, to unite with the tendon of the extensor longus in a more connected form. (*Vide* 8, *Fig.* 1, *y*, *Fig.* 2,

Plate VII.) It likewise gives off a posterior expansion that surrounds the perforatus tendon, fixing it in its situation. (*Vide* 10, *Fig.* 1. 9, *Fig.* 2, *Plate* VII.)

The *elastic suspensory ligaments* are of the greatest consequence to the extremities; they support the sessamoids in their situation, and by their continuation in front to join the long extensor, bind down this tendon in its action, and support the pastern in its extensive flexions; acting, in conjunction with the sessamoid bones, both as a pulley and a lever. This ligament must evidently be liable to compression from splents, and from the ossification of the junction of the small metacarpals with the large; and though it is not very vascular or sensible, yet the cellular membrane surrounding it is so. It will, therefore, appear evident, why *splents* placed posteriorly, should be more liable to lame a horse than when placed more to the side of the leg. In regarding *z*, *Fig.* 2, of *Plate* VII, which is not far from the usual situation of splent, it will be seen that it must make a material difference whether a splent exists behind or before this ligament; when behind this, it must interfere with this ligament; when situated before, it will interfere only with the integuments: but placed behind this, we may again remark a splent must, during its increase, by its rough surface, wound the vascular membrane of the ligament, as well as the ligament itself, which has some sensibility, particularly under inflammation; and, by this means, pain and lameness must be the consequence.

Besides these, there are two other peculiar ligamentous substances, which are inserted into the flexor tendons, and appear designed to confine them down in their action, and to support them under violent exertion. The superior of these (*vide r*, *Fig.* 2) arises from the inner edge of the tibia, and is fixed into one of the heads of the perforans muscle, just before its junction with the rest, by which means it acts upon the whole. The other arises inferior to this, from the posterior part of the canon, near the origin of the suspensory ligament, and then branches into two portions to insert itself into the two sides of the perforatus tendon. (*Vide s*, *Fig.* 2.) By these, the flexors of the foot are not only suspended, and their action increased, but the latter is eminently useful in preventing the perforans tendon slipping from the perforatus above, as the ring of the perforatus does the same below.

The various tendons of the canon and foot have each a *sheath*, or *theca;* between which and the tendon, exists a mucus to prevent the effects of friction; and to secrete which, the inner surface of this theca is very vascular. It often happens that this vascular surface becomes inflamed from extension of the parts, when, instead of mucus, coagulable lymph is thrown out between the sheath and the tendon; hence motion is rendered painful and imperfect, and swelling remains: this is usually termed a *clap*, or *strain in the back sinews;* but sinews or tendons are perfectly inelastic, and consequently cannot correctly be said to be strained; yet they may be ruptured, though this is seldom the case; but what is termed a

Fig. 2.
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strain in the back sinews, is either the effect of inflammation between the sheath and the tendons; or, in more violent cases, there is often a laceration of the cellular substance interposed between the one and the other. Sometimes the sheaths themselves are ruptured, in which instances the lameness is excessive, and the limb incapable of sustaining much weight; but yet it is not brought to the ground; although this receives the name of *breaking down*. It is, however, evident, that the term of breaking down ought only to be applied to a rupture of one or both of the tendons, and which very seldom occurs; and when it does happen, may be known by the fetlock being actually brought into contact with the ground.

The *vessels and nerves of the extremities* have been fully described in the Angiology and Neurology.

THE POSTERIOR EXTREMITIES, OR HIND LEGS.

Description of plate VIII.

The Reader is requested to observe, that the muscles of the buttock and superior part of the extremity, are to be seen in Plate VI.

Plate VIII, represents a right and left hinder extremity. In the right extremity, the femur or thigh bone is seen whole, with some of the external muscles removed, and part of the canon taken off. In the left extremity the greater portion of the femur is removed, but the whole of the tarsus and metatarsus is shewn.

Figure the First.

a, rectus cruris muscle inserting itself into the head of the patella; the line between it and 2 is the division of the cruris from the cruralis: all the rough marks along the femur up to its neck are remains of the vastus internus cut off from its origin at the cervix of the femur; *b*, the insertion of part of the triceps muscle; *c*, a ligament of the patella continued into the outer part of the tuberosity of the tibia; *d*, a ligament from the inferior part of the patella, united with a continuation of the rectus tendon; *e*, the popliteus muscle; *f*, a ligament extended from the outer side of the tibia, forming part of the general ligament of the hock and canon; *g*, the plantaris muscle; *h*, *h*, the two heads of the gastrocnemius muscle; one is cut off to shew the parts beneath; *i*, the perforated muscle; *k*, the perforating muscle; its oblique fibres are seen running into its tendon, immediately below which is the nerve of the leg passing with it; *l*, the assistant flexor of the foot; *m*, the invested bifurcating tendon of the flexor of the canon; *n*, the investing tendons of the same muscle; *o*, the general outer annular ligament of the hock; *p*, the fascial ligaments formed from the fascia of the perforatus muscle; *q*, the continuation of the general aponeurotic ligamentous expansion attached to the small metacarpal bones; *r*, an articulatory cartilage interposed between the end of the tibia, and the flexor of the canon; *s*, *s*, the inner condyle of the femur, articulating with the tibia, and resting on the articulatory semilunar cartilage; *t*, part of the tibialis anticus, or extensor of the canon; *u*, the patella connected to the thigh by the insertion of the muscles of the leg, and by its ligaments; *v*, the head of the femur, with the cavity, in which is contained the ligament connecting it with the acetabulum; below is seen the rough edge of the capsular ligament cut off; *x*, the great trochanter; *y*, the tendons of the perforating muscle; *z*, the tendons of the greater and lesser flexors of the foot; 1, is a ligament from the femur to the head of the tibia, formed in part from a continuation of the triceps muscle; 2, part of the crural s muscle; 3, semilunar cartilage; 8, the usual situation of windgalls on the hock.

Figure the Second.

a, the patella connected to the thigh, by the insertion of the rectus muscle superiorly, and of the vastus externus muscle at *i*; and below by its ligaments; *b*, a ligament from its outer side to the head of the tibia, united with a portion of the tendon of the vastus externus; *c*, a lateral ligament of the patella; *d*, the tendon of the tibialis anticus arising from the front of the condyle of the femur, forming an attachment of the femur with the tibia; *e*, part of the semilunar cartilages attached to the tibia by a ligament; *f*, the tendon of the lateral flexor of the foot, forming likewise an attachment from the femur to the fibula; *g*, the insertion of the popliteus muscle; *h*, the outer condyle of the femur; *i*, part of the vastus internus; *k*, the gastrocnemius muscle; its tendons are seen running down twisted within the fascial ligaments; *l*, the perforans muscle; its tendon is seen passing down at *t*; *m*, the lateral extensor; *n*, extensor longus; its tendon is seen at *r*, and between it and *s*, is seen the artery of the leg passing down; *o*, the investing part of the tibialis anticus; *p*, the invested bifurcating part of this tendon; *q q*, the general annular ligaments of the hock, formed from the expansion continued from the edges of the tibia, and carried downwards around the canon, leaving the posterior parts of it at 14, but continued in front over the tendons of the flexors of the foot, and the ligaments united with them, from the sides of which it is reflected on to the small metacarpal bones: in the plate it is cut off to shew the parts beneath; its cut edges are seen adhering to the metacarpal bones: the portion between *q q*, which is thinner than these peculiar bands, is removed to shew the part underneath; *r*, the tendon of the extensor of the foot; *s*, the tendon of the lateral extensor; *t*, the tendon of the flexor of the foot; *u*, the inferior head of the tibia articulating with *v*, the os calcis; immediately below it, is seen some lines which describe the posterior ligament of the hock, which is usually the seat of curb; *x*, the fascial ligaments, formed from the fascia of the perforated muscles; *y*, the twisted tendons of the gastrocnemii; *z*, plantaris muscle; 1, the union of the tendons of the extensor of the foot; 2, the elastic bifurcating suspensory ligaments continued on to unite with the extensor of the foot, and giving an expansion to bind the flexor tendons down; 3, the metacarpal bones within their ligaments, continued on to the ligament of the pastern; 4, the perforated muscle going to its insertion; 5, the perforating muscle entering the foot; 6, the expansion of the bifurcating ligaments; 7, the union of the bifurcating ligaments and tendons of the flexor muscle; 8, the ligament of the pastern formed from its own proper ligament, and a continuation of the ligaments from the small metacarpal bones; 9, the little extensor muscle; at this part is likewise seen the sheaths of the tendons of the flexor muscles; 10, the anterior ligament of the patella; 11, the bursa mucosa that surrounds the tendons of the flexors of the foot, and that in its dilatation forms windgalls in the pasterns; 12, an articulating cartilage between the tibia and flexor tendons; 13, the bursæ mucosa of these tendons, which form the windgalls of the outer side of the hock; 14, is the part where the ligamentous expansion terminates posteriorly.

DESCRIPTION OF THE POSTERIOR EXTREMITIES.

On removing the skin from the loins, croup, thigh, and leg, the muscles of these parts are so covered with a strong firm expansion, called *fascia*, as to be indistinct till it is removed. This fascia is intermixed with fat and cuticular nerves, and does not appear to be produced by any particular muscle alone, but arises conjointly from all the muscles of the posterior extremity; principally, however, from those situated on the loins and buttock, and is found particularly strong and firm on the outer side of the thigh and leg, so as

greatly to strengthen the muscles in their action. This peculiar ligamentous expansion is acutely sensible under inflammation; and I am disposed to attribute to an inflammation in this, that distressing sensation frequently felt by a horse in blistered legs, grease, or other open sores behind; in which instances the animal is observed, after he has been suffered to remain quiet a little time, when he next moves, to draw his leg up to his body in a convulsive and distressing manner; sometimes to such a degree as nearly to fall over.

The integuments of the hinder extremities, like those before, will be found to be naturally much thickened, particularly over exposed parts: they are remarkably so over the hock, and down the canon likewise; and as the hinder part, where the back sinews are situated, is much exposed, so they are there peculiarly thick and strong. At the coronet the thickness is also considerable; and in many parts of the hinder legs, as in those before, the skin appears attached by peculiar ligamentous fibres; so that in dissecting the integuments, it is often difficult to remove them in such a manner as to be exactly able to ascertain, what is the appropriate ligament to the parts remaining, and what only rendered the adherence more intimate between the integuments and muscles. As soon as the skin is removed, the external layer of fascia then appears, and upon which two considerable veins are observed to pass superficially: sometimes there appear more than this number; generally, however, one runs on the inside of the hock, and is that which, when varicosed, forms blood spavin; the other is situated in the hollow formed between the tendo Achilles and the flexor muscles. Like the fore extremities, the upper parts of the hinder limb appear covered with a true fascia, or tendinous expansion; but the lower have this expansion formed of apparent layers of cellular and ligamentary substance; one is dense, firm, and inelastic; the other is dense, firm, and very elastic: the fascia itself is also composed of several layers, some of which surround only one muscle; some a set of muscles of the same action; and some form a general investment of the whole; yet all of these intermix. The fascia that covers the inside of the thigh is not so dense as that on the outside.

Muscles situated on the Pelvis and Thigh, belonging to either the Thigh or Leg.

In the division of these muscles it will be seen I have, as in those of the fore extremities, differed from all former authorities; but in this I was not stimulated by any love of novelty, nor by any presumption in supposing my own mode unobjectionable; but because I was not aware of any division known to me that appeared so correctly to describe these parts.

Tensor vaginæ femoris.—This muscle is called, by Stubbs, musculus fascia lata, and arises from the anterior angle of the ilium; connected posteriorly with the external glutei, it runs into the flank, thus appearing, at the lateral external part of the thigh, a thin fleshy

expansion, which soon degenerates into an aponeurosis, uniting in some degree with that from the other muscles, to cover the external part of the thigh very strongly, as well as part of the leg: being continued over part of the inner side of the thigh immediately under the fascia expanded from the panniculus carnosus, it inserts itself into the patella, as well as into the head and lateral part of the tibia. (*Vide g, fig.* 3, *Plate* VI.) This muscle tends to bend and abduct the thigh; it likewise, by stretching the vaginal fascia, increases the general strength of the muscles, and, as such, this name is a more proper one than that of fascia lata.

Gluteus posticus, or *externus*, is the outer of the glutei muscles, and is not, as in the human, the largest: it arises by two portions; an anterior from the anterior angle of the ilium, and a posterior from the posterior angle of the same: between these two heads a semicircle is formed, leaving the gluteus maximus exposed: at least it is only covered by a slight expansion of aponeurosis, from which this part of the muscle takes its origin; it then inserts itself at the small external trochanter, by a flat tendon, first giving off along the posterior side of its belly a firm aponeurosis to the muscles within the thigh. (*Vide fig.* 3, *Plate* VI.) It acts as a flexor and an abductor.

Gluteus maximus is not, as in the human, situated the most externally of the glutei muscles, but is placed under the former one; it is a very large muscle, contiguous to, and blended with, what Mr. Stubbs has called the sacro lumbar mass, and fills up almost the whole of the croup, covering the external surface of the ilium and lumbar vertebræ: arising from the spinous processes of these as well as those of the sacrum, and from the anterior and superior spine of the ilium; when, contracting, it becomes interspersed with tendinous layers, and terminates by inserting itself very strongly into the trochanter major. (*Vide f, fig.* 3, *Plate* VI.) It acts by drawing out the femur, by which it can straighten the limb, and force it outward and backward.

Gluteus minimus.—This muscle is a small mass immediately under the former muscle, arising from the ilium above the acetabulum, and inserted immediately under the former, and into the trochanter. It must assist the foregoing.

Biceps flexor cruris arises principally by two heads; the longest of which originates in common with the next described; the other from the tuberosity of the ischium: these two heads form one muscle, which inserts itself in a double manner by a tendon which is fixed into the patella. By the length and mode of these insertions its powers are much increased, and it can act strongly as an abductor and a flexor. (*Vide b, fig.* 3, *Plate* VI.)

Flexor cruris posticus forms what Stubbs calls the semi tendinosus, and is so called in the human subject: by Bourgelat it is named the demimembranosus; but which are both indefinite terms. It arises by two heads, from the ligament of the sacrum and ischium; the tuberosity of the latter, and from some part of the coccygis:

descending along the posterior part of the thigh, it inserts itself into the internal surface of the tibia, three inches below its head; it likewise forms an aponeurotic expansion. (*c*, *c*, *d*, *fig.* 3, *Plate* VI.) Since I formed this myology, I have thought that the former muscle might be more properly called biceps abductor, and this biceps adductor: they are both flexors, but this latter is also an adductor.

Semimembranosus.—This muscle is a part of Bourgelat's longus vastus; it arises from the tuberosity of the ischium, and the whole of the inferior angle; and from an aponeurosis connected to some part of the length of the femur; it then passes down in a fan-like form to be expanded into a broad fascia; the anterior portion of which is inserted into the anterior part of the femur and tibia: its posterior covers the posterior muscles of the thigh, leg, and tendo Achilles. (*Vide a*, *a*, *fig.* 3, *Plate* VI.) The whole must powerfully flex the leg, and abduct both thigh and leg.

Capsularis is a small fleshy and apparently distinct slip from the glutei muscles, arising from the brim of the acetabulum, passing over attached to the capsular ligament, and inserted into the lateral superior part of the femur. Bourgelat calls this the straight muscle, and describes as its use, that it assists in rotating the thigh: but it appears to me intended to keep the capsular ligament from being pinched between the pelvis and femur.

Muscles on the Inside of the Thigh.

Gracilis.—This has been called biceps adductor, and, by Bourgelat, the short adductor; nor is it hardly thin enough to be named gracilis, as in the human. It has a line of division through it, and is that muscle that first appears on the inner side of the thigh on removing the integuments and fascia; arising from the pubis, and from the ischium, and terminating by an aponeurosis, covering the internal part of the thigh, and more particularly ending in the superior and internal part of the tibia. (*Vide b*, *fig.* 4, *Plate* VI.) It is a principal adductor of this part. Bourgelat gives the name of gracilis internus to the muscle which is analogous to the semi tendinosus, and which we have named triceps adductor femoris.

Sartorius is so called from its crossing the legs, by which it becomes of great use to tailors; but it is questionable whether *adductor longus* would not be a more proper name for it in the horse. It arises from about the middle of the brim of the pelvis on its inner edge, and passes obliquely across the psoas and iliac muscles to terminate in a small tendon attached with the gracilis to the upper and lateral internal part of the tibia. It flexes and adducts the leg and thigh. (*Vide h*, *fig.* 4, *Plate* VI.)

Psoas parvus is a muscle proper to the loins, and which is often wanting in the human, but is always present in the horse. (See *Muscles of the Loins, and d*, *fig.* 4, *Plate* VI.)

Psoas magnus arises from the two last false ribs, and last lumbar vertebræ on the outside of the psoas parvus; continues attached to

the pelvis in its descent, and is inserted into the internal trochanter. (*Vide e, fig.* 4, *Plate* VI.) It draws the thigh forwards. The disease existing in the cellular membrane of this muscle, called psoas abcess, is not found in the horse; which perhaps strengthens the opinion that this complaint first forms in some of the bones of the spine, and to which affection also the horse is not subject.

Iliacus internus magnus.—This muscle arises from the internal surface of the ilium, passes on the outer side of the preceding, and terminates with the former. It rotates the thigh, and bends it inwards. (*Vide f, fig.* 4, *Plate* VI.)

Iliacus internus minor is a muscle not present in the human, arising from the brim of the pelvis, and inserted into the small trochanter, by which it assists the former.

Pectineus takes its origin from the pelvis at the os pubis, and is inserted rather below the internal small trochanter. It draws the thigh inwards and upwards. (*Vide c, fig.* 4, *Plate* VI.)

Triceps adductor femoris arises by three heads; one from the internal edge of the pubis; another from the interior branch of the ischium; and a third, smaller, from its tuberosity; passing down together, but not intimately united: one is inserted into the posterior part of the femur; another into the superior and internal part of the tibia; the third inserts itself distinctly into the internal tuberosity of the femur. This last portion Bourgelat calls gracilis internus. (*Vide a, a, fig.* 4, *Plate* VI.) These portions all flex the leg and thigh, and draw it inward. (*Vide b, fig.* 1, *Plate* VIII.)

Vastus externus arises broad and fleshy from the root of the trochanter major, and external lateral parts of the femur, and inserts itself into the lateral part of the patella.

Rectus cruris arises by two tendons; one from the ilium above the acetabulum; the other from the upper part of the femur: its fibres run in a penniform manner, having a tendinous centre. It is inserted into the upper part of the patella by a very strong tendon, which sends an expansion over this bone, and unites with a powerful ligament (*vide Plate* VIII), extending from its lower part to the head of the tibia: this expansion is united with a similar one of the vastus externus, and which, by this means, sends off from its side a fellow one that connects itself with the tibia laterally. These bands are assisted, both in their strength and formation, by the fascia which covers all the joint and adheres to this part. (*Vide i, fig.* 4, *Plate* VI.) This muscle acts with the vasti, in straightening the leg by drawing up the patella.

Vastus internus, taking its origin from the neck of the femur, and from its whole inner surface; is continued down to be inserted into the inner side of the patella.

Cruralis, or *crureus.*—The propriety of the division of this into a distinct muscle admits of a doubt; for it is very much blended with the three former, occupies the lower portion of the femur, and is inserted with the preceding into the patella. It must be evident, that the foregoing muscles are joint extensors of the leg; and when

we observe their mode of insertion, we shall be aware they can act with surprising strength, which is increased by the patella elevating their tendons from the centre of motion: and which likewise gives a smooth surface for these two bones to act upon, and acts itself as a pulley to the muscles; for as they are short, so they require a mechanism whereby the advantageousness of their position may be increased.

Obturator externus arises from the inner crus of the Ischium, surrounds the foramen thyroideum; and likewise arises from the ligament covering this oval opening: collecting its fibres, it passes rather around the root of the back part of the neck of the femur; and is inserted by a strong tendon into the cavity at the back part of the great trochanter. Though it is a short muscle, yet by its direction, and by multiplying its points of contact, and those advantageously, it can act with considerable strength in rotating the thigh inwards; directly contrary to the action of the same muscle in the human.

Quadratus femoris is a long thin muscle not described by Bourgelat, arising from the lower portion of the ischium, and inserted a little below the great trochanter, by which it rotates the thigh outward.

The *gemini* are two slips arising, one superior to the other, from the ischium and pubis, near their junction; and inserted along with the preceding, to which they in common with the two next muscles are antagonists.

Obturator internus arises within the pelvis from around the foramen thyroideum.

Pyriformis arises within the pelvis from the sacrum; both this and the former pass out at the nitch in the ischium with the posterior crural nerve, and are inserted with the gemini, assisting them in their action.

The Muscles of the Canon.

The *popliteus* is a muscle that may be described either as belonging to the leg or canon. Bourgelat chooses the former, and calls it the abductor, describing it erroneously as a very small mass, whereas it will be seen, that it is a very considerable muscle. It appears to me, that, in all the descriptions of it, both in the horse and man, its origin has been mistaken for its insertion: it seems to arise from a ridge on the internal side of the tibia, below its head (*vide e*, *Fig.* 1, *Plate* VIII); with its fleshy fibres running obliquely outwards and upwards, to be inserted by a tendon into the lateral part of the external condyle of the femur (*7*, *Fig.* 2), having in its course adhered firmly to the capsular ligament of the joint. Its use is extensive and various; it strengthens the articulation by approximating the ends of the bones, prevents the effects of concussion, and is no inconsiderable flexor of the canon, turning the hock inwards, and preventing the capsular ligament from being pinched; it also attaches the semilunar cartilages.

Tibialis anticus.—This very curious and complex muscle forms the flexor of the canon of Bourgelat. It is a biceps, having two origins; the first by a very strong tendon (*d*, *Fig.* 2), from a cavity on the anterior part of the external condyle of the femur, which tendon performs the office of a support to the joint, and likewise serves as one of the origins of the flexor of the foot: this tendon, then passing inwardly, is received by the fleshy part which arises from the cavity behind the anterior spine of the tibia for nearly its whole length, and is continued down still in a tendinous form within this fleshy part, and only slightly united with it: towards the inferior part of the same portion it degenerates into a tendon, which now in turn becomes invested, being surrounded by the tendon of the first origin, and, coming out from that (*vide m*, *Fig.* 1, *p*, *Fig.* 2), it bifurcates into two branches, one of which is longer, and expands to insert itself on the inner side into the lateral and posterior part of the canon: the other, and shorter, is inserted into the anterior and superior part of the head of the canon. The investing tendon (*vide n*, *Fig.* 1, *o*, *Fig.* 2) likewise divides into two branches, which attach themselves near those of the former portion, but rather superiorly. By this peculiar mode of insertion of its tendon, it acts with much greater force and advantage, embracing more points of contact, acting upon several points of the hock at the same time, and by these means strongly flexing the canon.

Gastrocnemius (*vide h h*, *Fig.* 1, *k*, *Fig.* 2) forms what Bourgelat calls the gemini; but which in the horse is only a biceps, and therefore it does not deserve this name as in the human, where they are really a pair of muscles of twin action, origin, and insertion. The origin and termination of this, like the former, are not a little curious, arising by two distinct heads, an inner and outer; the outer arises from the inferior portion of the femur, at the external part; descending, it then gives off a flat tendon, which, about midway along the tibia, becomes rounded, and passes under the tendon of the internal head. This internal head arises less fleshy (*vide h*, *Fig.* 1) from the lateral internal part of the femur, just before it expands into its condyles: it soon becomes tendinous, and its tendon stretches over that of the external, both becoming curiously twisted with the plantaris tendon, and united with cellular substance, into a rope with spiral windings (*vide y*, *Fig.* 2): from this it passes down rather to the outer side of the perforatus tendon, between the ligaments united with it; where the rope inserts itself into the point of the calcis or hock; the tendon of the internal head sending down an expansion to the canon and parts below.

This muscle forms the extensor of the hock, and is one of the most important of those concerned in progression. It is by means of this, that the angle of the hock being opened by carrying the hinder extremity forward, as in galloping, leaping, &c., the horse is enabled to throw his body onwards, by again contracting the angle; and hence it is that a wide hock is of such advantage: for the farther this muscle is removed from the centre of motion, so much can it act

with the greater force; and hence we see great wisdom in the formation of this muscle, which, by being divided into two portions, presents a greater number of points of contact; and also, by the division and twisting of its tendon, the strength becomes greatly augmented.

Plantaris forms the lateral extensor of Bourgelat, and is a very small thin muscle arising from under the external head of the gemini above the outer condyle of the femur: passing down fleshy and obliquely, it crosses the tendon of the gastrocnemii (*vide g*, *Fig.* 1, *z*, *Fig.* 2) from within outwards, and inserts itself by a tendon into the point of the hock, in company with the gastrocnemius muscle, sending down an expansion that affixes itself into the inner side of this part. Its use appears doubtful in the horse, for, as an assistant to the flexor muscle, it is too trivial to have had a separate existence: nature, who ever works with as much simplicity as is consistent with the proper formation of parts, and with the regular economy of the organs, will not make a small and large muscle, when one would be adequate to all the ends of the contraction: but it is more reasonable to suppose, that it acts during progression in keeping distinct some of the muscles and ligaments of these parts.

Flexor pedis perforatus posticus arises near the origin of the gastrocnemius in the cavity behind the condyles of the femur: its fibres uniting, it proceeds from the inner side of the tendon of the gastrocnemii to the outer and posterior part, and then passing down, it receives the expansion of the fascial ligament, at *p*, *Fig.* 1, *x*, *Fig.* 2, and is, by this means, bound more closely to the point of the hock, at which part it is considerably expanded to receive the point of the os calcis into a kind of sac or cap, in which synovia exists: so that here also a wound of this part, sufficiently deep to penetrate the tendon, would have the effect of opening a joint. It then runs down the posterior and inferior part of the hock, and is seen in *Fig.* 1 and 2, having the investing fascial ligament cut off * to shew its progress as it proceeds to meet the perforans tendon, which it passes to the outside of, and surrounds its outer portion: continued down, it wholly encircles the perforans tendon at the pastern (*vide b*, *Fig.* 2), in a similar manner to the perforatus of the anterior extremities, when running through an expansion formed jointly from the elastic suspensory ligaments, and that extended from the small metacarpal bones, it bifurcates into two portions (*vide* 4, *Fig.* 2), which are inserted one on each side of the large pastern at its inferior part, sending an expansion to the heels of the sensible frog.

Flexor magnus pedis perforans posticus arises from the posterior and external parts of the head of the tibia; continuing down, it receives oblique fleshy fibres, which pass into its tendon (*vide k*, *Fig.* 1) from the inner edge of the tibia, and some from the outer edge; between which two places runs the posterior tibial artery, and some

* The term *fascial ligament* may probably be objected to; but as I observed it formed from a continuation of the fascia, and that it performed the office of a ligament, I so named it, till it gains a better.

small branches of the vein and nerves: at the beginning of the hock it becomes one strong tendon, which enters into a groove, formed on the inner side of the calcaneum, and slides upon the articulation of the tibia and hock, having a cartilage interposed for the purpose of preventing friction. (*Vide r, Fig.* 1, *t, Fig.* 2.) This groove it passes into, under an annular ligament appropriate to it, and in common likewise under the general annular ligament of the hock: soon, however, after its passage through this groove, it comes in contact with the tendon of the perforatus muscle (*z, Fig.* 1), and is continued down on the inner side, having its posterior part covered by it, till it arrives at the pastern, when it becomes surrounded by the complete ring of the perforatus, to be inserted, as in the fore-extremities, on the coffin bone. The metacarpal nerve accompanies the gastrocnemius at its origin, and continues down on the edge of the tendon of this muscle, passing with it through the annular ligament on its outer side; it then gains the inner, and runs within it, to be divided and distributed over the foot and pastern (*vide r, Fig.* 1), just above which it is seen. This and the preceding muscle are the flexors of the foot, but this latter is more immediately so; while the former, which is much more complex in its terminations, and more divided in its uses, appears to belong to the hock, canon, and pasterns also; and forms a medium, whereby the actions of all the parts are uniform and consentaneous.

Flexor minus pedis perforans posticus arises at the posterior part of the head of the tibia; passing down on the outer side of the popliteus, it bends its course obliquely inwards, and proceeds under an annular ligament at the lateral internal part of the hock (*vide Fig.* 1): it unites about the middle of the canon (*vide* 2, *Fig.* 1) to the preceding, and to which it is thus an assistant.

Extensor longus pedis posticus.—This is the first of three muscles, by which the extension of the foot is performed. (*Vide n, Fig.* 2). It appears to arise first from around the tendon of the extensor of the canon, as well as by some tendinous fibres of its own; next from the head of the tibia at its outer part: it is then continued down, and becomes formed into a strong tendon (*vide r, Fig.* 2), which passes under the annular ligament, connected to the tendon of the next muscle by the little extensor, about the middle of the canon. (*Vide* 1, *Fig.* 1.) It then proceeds down in front of the canon uniting with the next muscle, to be continued over the front of the pastern, receiving the expansion of the suspensory ligaments (*vide* 7, *Fig.* 2): it inserts itself, as in the fore-leg, into the anterior eminence of the coffin bone, and to which it is similar in its action, extending the foot.

Extensor lateralis pedis forms the lateral extensor of Bourgelat, and is similar to the peroneus longus of the human; arising by a tendon from the lateral part of the external head of the femur, and likewise from the head of the fibula; running down, it becomes tendinous, and joins the artery some way under the annular ligament; then passing obliquely on the canon, it receives the fibres of the little

extensor, and at the middle of the canon unites with the extensor longus, to which it is an assistant.

Extensor minor is an expansion of fleshy fibres continued from the tendon of the extensor longus to the extensor lateralis, at the superior part of the canon, descending two or three inches. (*Vide* 9, *Fig.* 2.) Its principal use appears to be, that of approximating these two tendons, which must greatly assist them in their action by keeping them in a right line.

Ligaments and other Parts of the Hinder Extremities.

The bones of these parts have already been fully treated of, and the ligaments generally have been noticed with them; but there are others that are immediately appropriate to the motions of the parts, as well as some that connect them. It must be at once evident, that the articulation of the femur with the pelvis is formed with peculiar strength; so much so, there can be but little danger of dislocation. The thigh bone is held in the acetabulum by the means of two ligaments, whose strength is very great: the capsular arises from around the neck of the femur immediately below its head (see *Fig.* 1, *Plate* VIII), and is inserted around the whole cavity of the acetabulum: but the principal strength is derived from a ligament improperly called round, which is connected by one end to the cavity in the head of the femur (see *v*, *Fig.* 1, *Plate* VIII), and by the other to the acetabulum into a similar cavity: by the force of these two it is evident this head must be held very firmly in its place.

The articulation of the thigh with the tibia and fibula is formed likewise with great art and strength; and that the muscles forming this joint, or rather that the muscles extending these bones, might act with greater power, there was given a patella, which allows them to move on the parts below without incumbrance, or without interrupting the ease of motion; for which purposes, therefore, the whirlbone glides smoothly over the articulation in front of the condyles of the femur. This bony appendage is retained in its situation by means of very strong ligaments, which appear formed in part, of the fascia going over the joint; in part also from the tendons of the muscles of the thigh, and likewise partially from some proper ligamentous fibres. One of these, placed before, appears jointly formed of the rectus tendons extended over the patella, and continued with a ligament from its inferior and anterior portion into the cavity in the front and head of the tibia (see *d*, *Fig.* 1, 10, *Fig.* 2): another arises from its outer side, united to an expansion of the vastus externus muscle, and is inserted into the external part of the tubercle of the tibia. (See *c*, *Fig.* 1, *b*, *Fig.* 2.) A third slight one, which is removed in the plate to shew the joint, arises from the inner side of the patella, is continued with an expansion of the vastus internus, and inserted on the inner side of the head of the tibia. A fourth, coming from its outer side, inserts itself into the external condyle of the femur; there is likewise a correspondent one on the inner side,

and, independent of these, there are some strong fibres carried across the patella: the general capsular ligament of the joint also invests this bone. From the great strength of the muscles inserted into the patella, it is sometimes fractured by a sudden effort; more frequently by a kick (see *Fractures*); and this would oftener happen, thick as the bone is, were it not for these continuations of the tendons over it, which greatly increase its strength.

The articulation of the femur with the tibia, is held in its place by means principally of the crucial or cross ligaments, which originate from the posterior part of the femur, and, crossing each other within the joint, are inserted into the head of the tibia: the posterior arises within the articulation behind these ligaments, between the condyles, and terminates in the posterior part of the head of the tibia; which prevents this bone from being dislocated forward, as the crucial prevents both bones being rotated on each other. There is likewise continued on each side, from the condyles to the femur, a tendon which answers the purpose of a lateral ligament: on the outer side this is effected (*vide f, Fig.* 2) by the tendon of the lateral extensor of the foot; and on the inner side by an expansion formed of part of the triceps, and vastus internus muscles. In the front of the condyles the tendon of the flexor of the canon arises, and by this means forms an additional connexion, and to which may be added the capsular, which surrounds the ends of the bones. Within the joint is a cartilage, named, from its form, semilunar (3, *Fig.* 1, *and c, Fig.* 2), which is situated on the head of the tibia, is thicker in front than at its posterior part, and held in its situation by ligamentous fibres.

The hock is covered by the skin very strongly, which is likewise connected to it very closely, and is particularly thick at its posterior part. It may be remarked, that this is the most complex joint in the body, not excepting even the knee, and hence is very difficult to be understood. I have taken great pains to render my description of it clear, as well as accurate; nor can the student, with a proper attention to this, and a reference to the plates, fail of gaining an adequate idea of the formation of this very principal joint. It is invested generally by several layers of ligamentous substance; and immediately on removing the skin, there appears a very dense membrane spread over its surface and that of the leg, loosely, but evenly, forming the whole into one nearly smooth surface; that is, the tendons and ligaments underneath are not very prominent: this dense cellular substance may be raised in several successive layers; and when it is all removed, the muscles of the leg, the hock, and the parts below, will then be found to have still a strong tendinous or aponeurotic expansion firmly extended over them. This aponeurotic expansion appears to be the fascia of the semimembranosus and tensor vaginæ femoris, continued down over the muscles of the tibia, and, becoming stronger as it advances, it seems to give a complete covering to each muscle, and perhaps assists to form the sheaths of their tendons, as well as to be reflected generally over the whole. If it is

raised from the front of the leg, it seems to thicken as it gains the hollow formed between the tendo Achilles and the flexor of the foot, where it is very firm, and appears to end in two ligaments, which I have called fascial. These ligaments (*vide p, Fig.* 1, *and x, Fig.* 2) appear more immediately formed from a very strong tendinous expansion from the inner surface of the perforatus muscle. The annular ligaments likewise seem formed in part from this, and in part from a particular ligamentous expansion arising from the inner and outer side of the tibia, which, passing over and around the hock, attaches itself to the bones on the inner, outer, and posterior part, being continued down over the tendons, as well anteriorly as posteriorly, to some inches below the hock: posteriorly to about the origin of the elastic bifurcating ligaments, where it appears to be reflected over from one small metacarpal bone to the other, it passes down in the front, binding the extensor tendons to each other, and reflected from the sides, but leaving the flexors, that thereby they might not be impeded in their motion; for by being bound down they could not act to advantage, as situated too near the centre of motion: but this is not the case with the extensor tendons, which, from their situation, can only act when closely applied to the canon. Each of the tendons of the hock, and parts below, have a proper theca, which is smooth and loosely reflected over them; they have likewise another investment, which is a continuation of the general theca of the whole. Within the inner sheath, near to the termination of the tendons, those that have considerable actions to perform, and whose motions are extensive, are furnished with mucus to prevent the effects of friction; this slippery medium is contained within proper capsules, which are called *bursæ mucosæ*. The mucus is furnished from the secreting arteries of the part; which arteries, on any violent and continued action produced in them from great exertions, take on an increased or a diseased secretion, and this forms what is erroneously called *windgall*. Sometimes this mucus seems not so much increased as diseased; more frequently, however, this collection is merely increased: at other times, however, after it has been simply increased, the more watery parts are absorbed, and the remainder becomes gelatinous, or even more solid.

Unless the pressure of these *sacs* is considerable upon the neighbouring parts, the injury produced by them is trivial; but from their being placed usually in the neighbourhood of organs having much motion, when much enlarged, they may by that means become hurtful. Their most usual situation is in the bursæ of the hock (*vide* 3, *Fig.* 1) and pasterns (11, *Fig.* 2), both before and behind. The sheaths and bursæ of the bifurcating tendons of the flexor of the canon are liable to them likewise, and the tendons both of the large and little flexor of the foot (*h* and *l*, *Fig.* 1), at their entrance into their annular ligaments of the hock. The enlargement of the bursa of the tendon of the little flexor of the foot (*l*, *Fig.* 1) frequently occasions *blood spavin;* for the superficial branch of the vein, passing over the inside of the hock, becomes by this means pressed

upon, and its efforts to overcome this obstruction occasion an increase in its coats. The investing fascia covers also a bursa at the point of the hock, which is liable to a diseased enlargement similar to the others, and is then called a *capulet*. It is not, I am disposed to believe, so much the mechanical effects of the pressure on the surrounding parts that produce mischief, as the diseased action brought on by this continued stimulus to any part, occasioning an alteration in its form, and an absorption of the portions immediately subject to the pressure, and perhaps from some other bodies foreign to their nature taking their place. Thus, from the increase of a bursa mucosa, the surrounding ligaments may be absorbed, and bony matter deposited in their room: for in all increased action of any of these parts in the horse there is a great disposition to a bony deposit, apparently from a law in the economy, whereby it endeavours to strengthen a weak part by a more solid support. Hence likewise exostosis of the bones of the hock, usually called *spavins*, may arise from some inflammation existing within either the tendon or ligaments; for these parts, having but few of the powers of life when they become enlarged, do not soon return to a healthy size; but the increased pressure may occasion an inflammation of some of the neighbouring bones; the constitution taking the alarm, throws out a preternatural quantity of osseous matter, which by this means occasions spavin.

Besides these general ligaments of the hock we have described, there are particular ones connecting the bones firmly together, and which are very difficult to make separate divisions of: they appear to run one into another; but from the course of the fibres we may distinguish, that each bone has a separate plan connecting it with the contiguous ones: these ligaments are not, however, so stretched, but that the bones of the joint have some motion on each other, which must assist the angle of the hock. Besides the individual ligamentous fibres from each of these bones to those in contact with them, there are two lateral ones extending from the lateral parts of the tibia, over the sides of the hock, firmly connecting the tibia; there are likewise other plans of fibres extending in front, and posteriorly. The capsular ligament of this joint arises from the tibia, unites with the fascial ligaments, and is continued over its various bones to the superior extremity of the canon. At the bottom of the tibia may be observed a curious cartilage, held in its situation by an appropriate ligament, interposed between the posterior and inferior head of that bone, and the tendon of the flexor of the foot. It is probable, that some of the inveterate lamenesses of the hock, where nothing can be seen, arises from an ossification of this cartilage. (*Vide r*, *Fig.* 1, 12, *Fig.* 2.) There is likewise a very strong ligament at the posterior part of the astragalus, *below v*, *Fig.* 2, continued over the bones of the hock posteriorly, and to the small metacarpal bones, serving to connect them with the canon; besides which, they have fibres from their sides, which attachments become bony by age. It is this posterior ligament that becomes affected in

the *curb*, but the situation of the affection is usually rather lower down. The ligaments of the inferior joints are the same in the hinder with those we have described as belonging to the fore extremities.

THE STRUCTURE, FUNCTIONS, AND ECONOMY OF THE FOOT.

Description of Plate IX.

Figure the First

Represents a foot, with the arteries and veins injected with wax, from the pasterns; *a a*, the veins seen branching and ramifying over the foot, so as to form a complete network; *b b*, the arteries.

Figure the Second

Is a foot sawn down the middle, from just above the little pastern bone; *a*, the coffin bone; *b*, the coronet, or small pastern, which is here represented rather too long; *c*, the navicular bone, confined by its ligaments; *d d*, these ligaments of the navicular; *e*, flexor tendon of the coronary bone; *f f*, flexor tendon of the coffin bone; *g*, the sensible frog; *h h*, the sensible sole; *i*, the sensible laminæ; *k*, the coronary ligament; *l*, the extensor tendon of the coffin bone; *m*, the horny or insensible frog; *n*, the horny sole.

Figure the Third

Represents a foot without the hoof; *a*, the sensible laminæ; *b*, the laminæ of the sole continued from the front round the heels; *c*, the sensible sole; *d*, the sensible frog; *e*, the cartilaginous part of the frog continued from the lateral cartilage; *f f*, the vascular coronary ligament; *g g*, the lateral cartilages.

Figure the Fourth

Shews the coffin, the navicular, and coronary bones, with the flexor tendon attached, to shew its connexion with these bones; *a*, the coffin bone without the lateral cartilage attached to the left side; on the right is seen an ossification of the right lateral cartilage; *b*, the navicular, or shuttle bone; *c*, the flexor tendon passing under the shuttle bone to be inserted in the coffin; *d*, the articulating cavities in the coffin and navicular bone; *e*, a groove for the passage of blood vessels between the lateral processes of the coffin; *f*, the little pastern, or coronet bone.

DESCRIPTION OF THE FOOT.

The foot of the horse presents a mechanism truly wonderful and curious, and most admirably adapted to the habits and manners of the animal. All the complexity of structure, exhibited in the numerous phalanges of the fissipes, is here united into one. From the various artificial circumstances to which we subject this noble quadruped, such as stabling, hard roads, and the attachment of foreign substances to counteract the effects of the unyielding surfaces travelled upon, the feet become peculiarly susceptible of disease; and

as progression is the very foundation of the utility of the animal in question, so these diseases become objects of the greatest import to the veterinarian; to the proper understanding of which, an intimate acquaintance with the structure and economy of the parts composing the feet is absolutely necessary. In the colt, at birth, these are found less evolved than most of the external organs; were they more perfected, their hard surfaces might bruise the mother: but, on the contrary, at this early period the pasterns are long and upright, and instead of the extremities ending as in the adult, in a broad extended base, they terminate in a small circle of horny matter, pointed in front and behind, and presenting only the rudiments of a frog.

The parts composing the hind and fore feet are similar; therefore, by describing one foot, we teach the form of the whole. The bones entering immediately into what is termed the foot, as being within the hoof, are the coffin, and the navicular or shuttle bone: articulating with these, and partly within the hoof, is the little pastern, or coronary bone, which is also much connected with the economy of the foot. The *coffin bone* corresponds in shape to the hoof. In front it has an eminence, to which the extending tendon is attached; the sides extend back into two lateral processes, to the upper of which are fixed the lateral cartilages. Its superior surface presents two articular cavities, and its lower is vaulted, and attaches the flexor tendon. Its anterior part is covered by the sensible laminæ, and its whole structure is spongy (*vide y, Plate of Skeleton; vide a, fig.* 2, *and a, d, fig.* 4, *of Plate* IX), and curiously (particularly on its outer surface) formed into innumerable small ridges longitudinally disposed, evidently serving the purpose of favourable attachment for the laminæ. This curious texture is nearly obliterated in the old horse. The *navicular bone*, called likewise the nut and shuttle, is placed at the posterior part of the coffin bone, attached to that, and to the coronary also, by ligaments; one of which passes from its posterior part into the posterior portion of the coffin; two others stretch from its upper surface, and are inserted into the coronary bone.

The *coronary, or small pastern bone*, is seen in *fig.* 4, *f, and fig.* 2, *b, Plate* IX, and articulates with the coffin and with the navicular, to both of which it is united by capsular and appropriate ligaments; and upon this the great pastern rests. The *lateral cartilages* are two, affixed, one to each side of the coffin bone by indentation; they are externally convex, and internally slightly concave, having some portion covered by the hoof, and some without it. The *laminæ* are vascular sensible productions of the cutis, being elastic, and situate all round the anterior surface of the coffin bone, in leaves, or lamellæ, in number about five hundred, and which are received between correspondent horny ones in the hoof. The *coronary ligament* is a vascular expansion, projecting and extending around the coronet to the back of the frog; from the vessels of which the hoof is secreted. The *extensor tendon* is inserted under these parts

Fig. 4.
Fig. 2

into the anterior eminence of the coffin, and the *flexor tendon* affixes itself to the vaulted arch posteriorly. The *sensible frog* is situated next to this, and is made up of semi-cartilaginous and ligamentous substances, with some reticulated tendinous layers and adipose matter; and, by the elasticity of which construction, the expansion of parts is greatly influenced: the navicular bone rests in some degree on this and on the flexor tendon. The *sensible sole* lays under that part of the coffin, covered by neither of these latter substances. The *hoof* is a hard insensible box, which covers and protects almost the whole of these. Having thus mentioned the parts in this order, we shall retrace them in a contrary one, by which the student will be familiarized to their description.

The *hoof* of the horse is a horny envelopement, secreted from an expansion of the cutis, in a manner similar to that in which the human nail is formed from the portion of cutis termed the *quick*. Nature, who delights in similitudes, keeps up the likeness, however, in a less degree here than is usual: for in the horse, the nail envelopes the phalange inferiorly as well as superiorly; both surfaces meeting to form a round blunt edge which admirably corresponds with the wants of the animal. The hoof in its natural state is conical, but by no means so perfectly so as has generally been taught. Mr. Bracy Clark expressively describes it as an oblique cylinder truncated, with the truncated extremity brought to the ground: but age, artificial habits, and the application of shoes, tend much to alter its natural appearance. The hoof presents a considerable degree of obliquity in front, where also it is much higher than in any other part, the quarters or walls being less oblique and less high; and, as it approaches the heels, the obliquity becomes still more decreased, and the height also. In a natural state the hoof is also widest at the outer side of the inferior margin, by which a broader surface of support is afforded without encumbering motion, or increasing a tendency to cut. The structure of the hoof is fibrous, with its fibres longitudinally disposed, and which are separable by maceration. Heat and a want of moisture will also tend to separate them, as we know by that spontaneous division that frequently takes place in hard dry hoofs, called *sand cracks*. The *crust* of the hoof is all the horny part that appears laterally and anteriorly when a foot is placed on the ground; presenting surfaces externally smooth and convex, but internally concave and laminated. In the fore feet, the thickest and strongest portion of horn is placed in front, as this part is the one most pressed on and exerted. The *quarters*, so called, are the lateral parts or walls of the crust; and, as in the fore feet, the anterior portion of each hoof is the thickest, so, in the hinder ones, the sides are by much the strongest: thus the fore shoes are principally fastened towards the front, but the hinder ones more towards the quarters. The inner side of the hoof is the weakest, and also rather the highest; and which natural formation is not in general attended to by smiths and farriers; for as this quarter is weaker than the other, so it always wears faster, and

which ought to be remedied by general care, and also by particular management in the shoeing: instead of which, the outer heel may be frequently observed to be the highest, before and behind, which, as it reverses the natural line of pressure, and produces an undue bearing on the weaker part, so it proves a fruitful source of splents, curbs, spavins, and contractions. The lateral parts, towards the heels, in both fore and hind feet, become thin in proportion as they proceed backwards; which appears a wise provision, that they might the more readily yield to pressure; and having reached the heels, the horn makes a sudden inflection inwards, as we shall hereafter describe. At its upper margin, the circumference of the hoof is whiter, softer, and thinner, than at the other parts; and this upper surface is internally hollowed out, and called the coronary ring, receiving into it a vascular prolongation of the cutis, which has received rather improperly the name of the *coronary ligament* (*vide k, f f, fig.* 3, *and k, fig.* 2, *Plate* IX.) Immediately contiguous to which, but rather under it, exists an elongation of dense substance, said to be a true continuation of the horny frog, as we shall notice. From the vascular coronary ligament is secreted the horn; and though the laminæ are also capable of secreting horn, as we know from what occurs in scoring the hoof, yet it is principally from this source that this substance is produced. That this coronary ligament, as it is termed, is not intended as a means of attachment between the hoof and its internal parts, is evident from the ease with which they may be separated from each other; and also further, from the circumstance of there being a complex apparatus, afterwards to be described, purposely to effect this union in the completest manner. Posteriorly, the hoof presents its inflections, with the intermediate space filled up by the fleshy or soft heels, formed from the frog inferiorly; towards the middle, by the elastic matter in which the sensible sole loses itself; and superiorly, by the cartilages covered with integuments and cellular substance. It was necessary that there should be a break to the continuity of the hoof, to lessen the effects of concussion and resistance; and the interposed substances we have described, that fill up the chasm, are, for this reason, of the most elastic nature. As, during life, the secretion of the hoof continues, so it was necessary that means should be provided for its waste or decay. The natural wear is usually sufficient for this in a state of nature; but when this is not commensurate with the growth, the extreme ends, beyond the reach of the tenacity of the matter, become brittle, and drop off in flakes.

The *horny sole:* the under concave elastic surface of the hoof is so called (*vide n, fig.* 2, *Plate* IX), and which is not so fibrous or brittle as the crust: it is also thicker at the circumference, where it unites with the crust of the hoof, than it is towards its centre. Its concavity admirably adapts it to embrace the ground, and prevent the dangers of slipping: but this concavity is not always equal; on the contrary, by the pressure of the parts above, it descends momentarily by virtue of its elasticity, which must decrease its concavity,

and at the same time must greatly relieve the body from the effects of concussion. This descent of the sole should be carefully kept in mind by the veterinarian, particularly by the operative smith; for if a shoe is so placed as to rest upon this horny sole, it cannot descend lower, and thus the sensible sole above it must be pressed between the bone and horn: if this pressure is considerable, inflammation and abscess may be produced.

The *frog* is the triangular horny portion that fills up the natural excavation of the under surface of the hoof. (*Vide m, fig.* 2, *Plate* IX.) This elastic pad bulges out beyond the immediate part it is in contact with, but not so much in general as to be beyond the level of the outer surface of the crust: it thus evidently receives its share of pressure. A horizontal section of the foot will shew the frog to be completely a distinct secretion; the line of separation, and the difference in structure, being rendered very apparent between this and the horny parts it is connected with. In fact, its connexion seems little effected by a mixture of fibres, but principally by internal prolongation of cuticular matter; and which connexions are propagated throughout all these parts. To the sensible frog above, it is also intimately connected by that adhesion that arises from inosculation of vessels; but more particularly it appears connected to it by a process of itself, that is indented into the sensible frog purposely to strengthen the union between the two. This also may be readily seen in a horizontal section of the foot, and it appears also in *Plate* IX. The posterior superior part of the frog is covered by the fatty elastic substance, into which the sensible sole blends itself, forming the soft fleshy heels: from whence its lateral parts appear to be continued by a true prolongation; or, otherwise, a firm lamen of elastic horny matter is reflected from it to extend around the under part of the coronary ring immediately below the vascular coronary ligament. Mr. Bracy Clark, who was the first that accurately described this part, calls it the *frog stay*, its use being evidently designed to support the frog in its situation. Mr. Coleman, I believe, denies its existence altogether; but an accurate dissection of the parts certainly demonstrates a prolongation of the frog, or otherwise a continuation of an elastic matter reflected from it. Mr. Clark, in return, denies the existence of the coronary ligament as described by Mr. Coleman; but which appears to me equally erroneous on his part also. A vascular fold or enlargement of the cutis, evidently thickened at this part to increase the surface of secretion, does actually exist: innumerable dissections have made the appearance familiar to me. Nevertheless, the disagreement between these two authors on the subject, is rather more in name than substance; for Mr. Clark allows that there is a process or enlargement of the skin within the coronary ring, but that it is not separable by maceration. This is therefore the coronary ligament described by Mr. Coleman, though probably under an erroneous term.

It has been observed, with considerable truth, that the real quan-

tity of horny matter, even in a full-formed frog, is not so great as would appear from a simple inspection of the under surface of the foot; for the frog is placed as an inverted arch with regard to the other parts (*vide fig.* 2, *Plate* IX): consequently smiths cannot cut with impunity so much as they frequently do; but in breadth a full healthy frog forms not less than a sixth part of the whole. Between the bifurcations of this part, a deep sinuosity appears, which is called its *cleft*; by means of which division the frog obtains a power of expansion, and also a capability of adapting itself to the uneven surfaces the foot may pass over. The formation of the horny frog is effected by secretion from a vascular part immediately over it, called the sensible frog: it is hence subjected to the same laws with the hoof and sole; and therefore when grown to a useless extent, it scales and detaches itself, and breaks away as that does. But it is necessary to observe, the growth of the frog is very seldom inordinate; on the contrary, in horses who have been often shod, more particularly if there exists the slightest disposition to contraction, the growth is hardly commensurate with the wear; and, in such cases, an imprudent smith may pare more away in three minutes than will grow in three months.

Modern physiologists have been very much divided in their opinions relative to the use of the frog; but all agree that it must be a very important part. Among the moderns, La Fosse first drew the attention more decidedly to the impropriety of paring it away, as it appeared to him so necessary a guard to the flexor tendon. Mr. Freeman considered it in a similar point of view, and also that, in conjunction with the navicular bone, it greatly assisted the spring of the tendon. Mr. Coleman denies that it can do either of these in any considerable degree, for it is not, he observes, so situated as wholly to guard the flexor tendon; nor can it so act as to assist as a spring to it: but he is at great pains to prove that its principal and determinate use is to resist the contraction of the hoof, to which there appears a constant tendency; but which, when of its ordinate size, the frog is fully equal to counteract. The professor, it may be supposed, argues very ingeniously on the subject; but the drift of his object is to prove that the horny frog presses on the sensible frog, which, by its connexions with the lateral cartilages, expands them, and that they, in return, force open the hoof.

Nevertheless it appears to me, that, upon an extended view of the matter, we should not be led to circumscribe the use of this organ to any one of these operations solely; but should rather conclude that it acts in various salutary ways. Its most important office appears to be that which a natural philosopher would at once assign it on viewing the external foot; for it presents itself evidently as a natural wedge to prevent slipping and sliding on smooth surfaces. It may be viewed, also, as an extended point of support to the soft elastic parts above it, that descend by pressure; and probably it acts importantly also as an antagonist to the downward and backward direction of the internal parts of the foot, by means of the

elasticity of the laminæ. It appears to me, that these its principal uses have been almost wholly overlooked; for that such are really the offices to be ascribed to it, may be readily allowed, on a strict attention to its external form, which admirably adapts it to these purposes; but which, on the contrary, would add little to its utility for the uses ascribed to it by others. That it may also assist to guard the flexor tendon is probable, but not in the way supposed; it more probably acts by giving a solidity of support to the insertion of this tendon, by pressing upon it during its strong extensions; and which is rendered more necessary from the suddenness and acuteness of termination in the tendon. An animal so weighty as the horse, and yet so speedy, required a mechanism of support peculiarly elastic: we accordingly find his foot so constructed as to be made up of springs: and, as it has been observed, that in a well formed foot the frog forms not less than one-sixth of the circumference; and as also it must be taken into the account, that, in some actions in which the horse first meets the ground with the hinder part of the foot (as is probably the case in the gallop of full speed and in very wide leaps); so, in such cases, to keep up the general spring of the parts, it was necessary that the hinder parts of the foot should be furnished with an apparatus as elastic as those of the fore. And though it is certainly not in the usual actions of progression, that the heel is first opposed to the ground; yet that there are times when it does so; and that this apparatus is intended to act at those times may be fairly presumed. Nor would it be prudent to deny, that the frog may *assist* in preventing contraction; not only by its simple resistance, but also by its action upon the elastic cartilages; yet it is presumed that it operates in this manner in a subordinate degree to that attributed to it by Mr. Coleman. Indeed, there are such other contrivances to effect this alledged expansion, as necessarily throw a shade over the action of the frog in this point of view.

As the very form of this organ shews that it was intended by nature to meet the ground; as also the reasons stated shew that it is essentially proper it should do so, and that this opposition of it to the surface of the ground is not so much by descent as by actual application; so the impropriety of cutting it away, as practised by some shoeing smiths, is self evident, and cannot be too much reprobated. Nevertheless, as the application of the laws by which dead matter is acted upon, to the operations of living organs, is that which has led to the greatest errors in physiology; so also a reasoning, founded on the uses of the organs to an animal *purely in a state of nature*, leads into error, when applied too closely to the same animal *living a life of art*. Therefore from this is meant to be inferred, that though the constant and full application of the frog to the ground in a state of nature, is not only harmless, but necessary; yet it does not appear but that in a horse living a life of art, subjected to long journies on hard roads, if a full and constant application of the frog were to take place against these surfaces, it

would probably not only wear away faster than it should, seeing it is not so bulky as a common inspection would make it appear; but that also, by such an extra degree of pressure, there is reason to know that the parts immediately placed over it would become bruised. Such a paring therefore, particularly in hard working horses, is proper as will keep it rather within, or at least not beyond, the level of the under surface of the circumference of the sole: the heels of the shoe being then sufficient to relieve it from inordinate pressure, as the yielding surfaces of the ground will still allow it sufficient application to operate in its useful purposes in progression. In general cases, however, it is apt to be pared below this; and as the regeneration, particularly in some feet, is very slow, so the evil becomes aggravated.

The *bars*.—We have already fully explained, that the crust of the hoof does not terminate at the heels, as a superficial observation might lead one to conclude; but that having gained the heels, it turns acutely inwards, decreasing in extent, and laying itself obliquely along each side of the frog to terminate at the point. The bars, or *binders*, as they are often termed by smiths and farriers, cannot be considered, therefore, as parts exclusively belonging to the sole; on the contrary, they more immediately belong to the crust of the hoof. If the subject is accurately attended to, they will be found to be infinitely more important in their office than is generally imagined. In the first place, it was essentially necessary to destroy the effects of resistance, and to lessen concussion, that the hoof should not extend around the foot; but that it should be interrupted by a chasm. It was also as necessary to guard against contraction, that it should not end abruptly around this chasm; nature therefore has wisely effected this termination in a way that not only increases the general elasticity of the foot, but also makes it the principal means in preventing contraction. The great obliquity of the bars is evidently intended for this very purpose; and so long as this outward bearing remains, and they are suffered to maintain their due approach to the ground; so long they must almost necessarily prove a *bar* to contraction. But the smith conceiving these parts useless, because he cannot immediately see their operation, cuts them out; and thus the foot loses one of its principal supports: and it is the peculiar but unfortunate tendency of this evil to aggravate its cause as well as its effects; for, as contraction commences, the obliquity of the bars decreases, and thus, in a twofold degree, is the mischief multiplied. Other circumstances may tend more immediately to hasten contraction; but the destruction of these parts is certainly pregnant with the evil. The bars, therefore, seem peculiarly designed to operate against the tendency to contraction that nature foresaw would be liable to take place in used feet; and they also appear to operate particularly in expanding the lower points of the heels, as the cartilages do by widening the upper parts of the same.

It may be worth while pausing a few moments to inquire into the

cause of the erroneous disposition in smiths to pare the foot unnecessarily. This habit is however more erroneous in the *part* operated on than in the *quantity* taken away: for if I am right in my conjecture, and I draw my inferences from a very extended experience, more evil results from a *want of paring* than arises from all the injudicious and extravagant cutting that occurs, great as this may be. It appears that the smiths wage war against the posterior and central parts of the foot instead of the circumference; and as these posterior and central parts are more slow in their reproduction, while the others grow more quickly, so the effects prove still more hurtful. A healthy frog presents a full rounded appearance, and meets the eye forcibly; and even the ease with which it cuts will alone invite the knife or butteris, and this the more, as when pared it leaves a neat clean appearance. But it would not exhibit this appearance of neatness so well, if any thing remained alongside to obstruct the view; therefore the *bars* are also removed to effect this, to clear all obstructions, and to make a smooth clear surface: for what possible use, a smith says to himself, can this hard ridge be of alongside the frog. Nor does the evil stop here, for as most feet, or, at least, a great number, present some incipient contraction; so it is observed by the smiths, that the inflections of the heels in these cases approximate and press on the horny frog, as well likewise on the elastic matter forming the heels; and in cases where the contraction is considerable, these parts really appear to *bind* in, as it is termed. Not considering, therefore, the immediate intention of these inflections, these persons are led to regard them as the offending parts, and they also are accordingly cut out. The very term given to this latter operation is fascinating, and shews the hold it has upon their minds: it can hardly be necessary for me to notice that this is popularly called *opening the heels;* but which it would not be difficult to prove might be more correctly called shutting the heels. However, as the cause of truth should ever be predominant, so it must be acknowledged that wiser persons than are the generality of smiths, might be incautiously led into this error; because, in many instances, a salutary effect is absolutely observed immediately to follow this operation; as where the approximation of the inflections is such, or, as more popularly expressed, where the binders draw in, so as to press upon the intervening substances; in which case real pain and lameness is occasioned by their pressure. In such instances, also, the practice may be admissible to give present relief; but the evil resulting from it should at the same time be counteracted, by the means recommended under contracted feet. From this detail of the important functions of these parts, and from the remarks that follow this detail, it may therefore be inferred how grossly erroneous must be the system that induces the smith to prepare a foot for shoeing, by removing totally the bars, and partially the frog; at the same time that they probably allow the sole and crust to retain an improper quantity of horn. From these remarks may be also learned, but more particularly from what will follow when the sub-

ject of contracted feet is considered; that the popular outcry against *paring of the foot* is wrongly directed: for, were a similar degree of paring practised on the sole and crust, instead of the bars and frog, a very great number of feet would be benefited by it.

The Interior of the Foot.

The first part that presents itself when the hoof is removed, is the *sensible*, or, as it is sometimes termed, the *fleshy sole* (*vide h, fig.* 2, *h, fig.* 3, *Plate* IX), which is a vascular expansion covering a considerable portion of the under surface of the coffin bone; extending beyond its posterior part, but leaving a triangular space for the vascular expansion of the sensible frog. As the sensible sole passes behind the coffin bone, it becomes thicker, and more elastic, and attaches itself to the cartilages, as also slightly to the navicular bone. Throughout its whole upper surface it is formed of a ligamentous or tendinous substance, but the whole of the under surface is covered with an expansion of the true skin highly vascular, and from which is secreted the horny sole. The vascularity of this part renders it very susceptible of inflammation, and only a moderate degree of pressure upon it from its horny covering will produce this; thus, if by accident the shoe should pres on the horny sole, it immediately inflames, and pus forms; and as the matter becomes confined by the horn, its attempts to find a vent make it extend itself around, which the farriers call *underrunning*. When pressure occurs also at the heels, if it is not violent, a bruise takes place: and as the sole is less vascular and less irritable at this part, so active inflammation seldom follows, but blood is deposited, and a *corn* is the consequence: yet if the pressure is very great, particularly if any foreign substance intrudes itself, as gravel, &c., then the same consequences are produced as in the other parts of the sole: similar effects also ensue frequently from punctures by nails or other sharp bodies. The sensible sole furnishes a few laminæ to correspond with those in the heels of the horny sole.

The *sensible frog* (*vide g, fig.* 2 *and fig.* 3, *Plate* IX) presents a very curious structure of ligamentous and tendinous expansions, the lamen of which are in divers directions, but with its under surface covered by a vascular expansion corresponding in shape to the horny frog, which is secreted from it. It lays in an interval formed within the sensible sole, attached by its point to the concave inferior surface of the coffin bone, with its heels expanding posteriorly beyond that, and attached to the posterior and lower portions of the lateral cartilages; at which part they are connected with, or degenerate into a lax cartilaginous substance, that, united with cellular substance, and the coverings of the skin, form the rounded bulbs of the fleshy heels. An inflammation of this sensible frog alters its secretion from horn into pus or matter, which finding its most ready exit between the cleft of the horny frog, is then called a *running thrush*. As this part is very prone to this diseased secretion, so thrushes are very common; appearing now and then in some

measure constitutional: but much more frequently they originate from some injury done to the sensible frog, and are kept up by a continuance of the same, or by the application of other causes favourable to the production of inflammation in the part. The form and situation of the sensible frog may be seen in *Plate* IX, *fig.* 2, *g*; *fig.* 3, *d*, *e*.

Above the sensible frog and sole, the *flexor perforans tendon* appears, inserting itself into the vaulted arch of the coffin; the perforatus is inserted into the large and small pastern bones, but sends down an expansion to the heels of the sensible frog. The flexor perforans tendon also, in its passage, gives ligamentous productions that attach the lateral cartilages, and form a kind of capsular ligament for the navicular bone: it becomes finally inserted into the surface of the arch of the coffin, having thus its upper surface applied to that bone, and its lower to the sensible frog.

The *lateral cartilages* are one to each side, and, from the great peculiarity of their situation, they must be very important parts. They are fixed into indented grooves in the lateral upper surfaces of the coffin bone, extending in front almost to each other, separated only by the insertion of the great extensor of the foot. Independent of their being implanted into the coffin bone, they are still more strongly held in their situation by means of ligamentous fibres, as well as by lateral connexions to the ligaments of the coffin and navicular bones, and likewise by a ligament given from the flexor tendon: their situation may be best learned by a reference to *Plate* IX, *g*, *g*, *fig.* 3. They are externally convex, and internally concave, having their middle portion the highest, the extremities gradually becoming thinner and smaller; the posterior portions pass beyond the lateral processes of the coffin bone, and unite with the semi-cartilaginous substance of the sensible frog. They are partly within, and partly without the hoof, and are covered at their lower portion by the coronary ligament, which, by being extended over them, prevents their too great dilatation: to their lower portion likewise the attachment of the laminæ takes place. Within the concavity formed by the extension of the cartilages beyond the coffin bone (see *fig.* 3, *Plate* IX), is lodged the ligamentous fatty substance forming the upper and posterior part of the fleshy frog. From a mistaken opinion of La Fosse, who asserted, that in quittor the cartilages must be wholly removed, much unnecessary extirpation frequently took place, when the improvements brought about by the French school first appeared among us. But we now know, that though it requires a violent process, yet that these parts will ulcerate, exfoliate, and heal like other parts. The *uses* of these cartilages are very important, and without them the foot would have been a very incomplete machine. Divested of these, the coffin bone appears but a small part, compared to the coffin that incloses it: but increased by the attachment of these, it presents a very extensive body, serving all the purposes of bone, yet being almost one half of it elastic, instead of solid and unyielding. They evidently

act upon all the upper portions of the foot, and in one part inclose the joint; but more particularly they appear to operate in the extension of the upper half of the horn of the hoof, as the bars do in the lower half. From continued pressure, these cartilages are very apt to ossify, particularly in draught horses.

The *sensible laminæ*. (*Vide a, fig.* 3, *Plate* IX, also *fig.* 1, *Plate* VII.)—In describing the hoof, we had occasion to notice that its internal surface was lined with numerous horny lamellæ, which possessed a considerable degree of elasticity obliquely downwards and backwards, with an arrangement of their fibres corresponding to this direction. These are, in contradistinction to those we are going to describe, called the *insensible laminæ*. Around the whole circumference of the coffin bone from above downwards, it is covered with about five hundred semicartilaginous leaves, each of which is received between, and firmly attached to two of the laminæ of the hoof, just noticed, and *vice versa*. It is therefore evident, that the surface of attachment between the hoof and the internal parts (for the coffin bone governs all the rest) must be most intimate and most extensive. Indeed it is so much so, that few accidents can separate these parts: inflammation, which dissolves the bond of union, is alone able to effect it. It is by means also of these principally, that the foot enjoys its spring, and almost wholly its support. It may, perhaps, at first sight, be imagined that the sole bears the superincumbent weight resting upon the coffin bone; but nothing is farther from the real truth: indeed, we find the sensible sole can bear little *continued* pressure, though its elasticity and form enable it to bear a portion of *momentary* pressure, and to descend in the efforts of the horse; being then moderately pressed on by the parts above. But it in no instance receives one twentieth part of the weight of that portion of the machine acting upon the coffin bone; on the contrary, it receives only so much as the elastic elongations of the laminæ allow it. That these laminæ are the means whereby the foot is sustained, appears evident from the following fact: A horse in whom both horny soles of the fore-feet had been removed, and who was remarkably given to kicking, still continued the practice, lashing out behind with both feet with great violence; yet no injury was sustained by the fore-feet. From this it is clear, that had the sole been intended to sustain the superincumbent weight, the feet must have actually forced themselves through the hoofs. The sensible laminæ are therefore the important organs whereby the internal foot is held in its situation within the hoof; and it is by these means that the foot enjoys the principal portion of its ease, elasticity, and freedom, from the effects of concussion: for the foot is internally observed to be oblique from behind to before; but the weight is not oblique, but nearly perpendicular: hence it is evident there must be a constant tendency to dislocation between the internal parts of the foot, the coffin bone being pressed down in a direction different from that of the internal surface of the hoof. As the laminæ both of the hoof and of the coffin are elastic singly, so they

are also highly so conjointly, and in their joint action allow a very considerable alteration in the position of the coffin bone obliquely downwards and backwards. Thus it would appear that, during action, the weight is first thrown perpendicularly on the pastern; from whence it is transmitted to the coffin principally, and to the navicular subordinately: but that the hard medium of these bones, and the equally hard medium of the earth, might not produce concussion and a hurtful pressure, these elastic laminated springs are admirably contrived, whereby the weight is distributed over a vast extent of surface; and that no auxiliary aid might be wanting, so was superadded the vaulted arch of the sole, which still further prevents concussion. It is evident also that this oblique and backward direction of the coffin bone, resulting from the elasticity of these leafy processes, must greatly tend to prevent contraction. Their formation appears dependent on the cutis, of which they are productions: they are longer in front than at the sides, and at the sides than behind, and are most intimately connected with the coffin bone. Acute founder appears to arise from an inflammation of these parts: they are also capable of a more slow or chronic inflammation, in which they lose their elasticity, and, yielding to the pressure of the coffin bone, they elongate, and permit it to rest on the sole, which, by this pressure, becomes first planiform, and then externally convex, forming what is termed *pumice footed*, or more properly, as observed by Mr. Clark, pomefooted.

The *vessels* and *nerves* of the foot have been particularly described in the Angiology and Neurology, to which I would refer the student. The vascular appearance may likewise be gained by a reference to *Plate* IX, *fig.* 1, where a foot with the vessels injected with wax is accurately represented. The *arteries* (*vide b, b*) may be seen situated posterior to the veins, one on each side, which first give each a branch to the coronet, and then are ramified throughout the anterior and posterior parts of the foot. The *veins* pass more anteriorly, a large branch to each side, when they ramify in a similar manner, but are beyond all comparison more numerous, forming a complete network around the internal parts of the foot, as well as penetrating its substance, and having the peculiarity of no valves to obstruct their passage. (*Vide a, a, fig.* 1.) The *nerves* are two small branches posterior to the arteries, passing down and giving rami to the different parts of the foot.

I have thus brought the description of this wonderful mechanism to a close: it is a subject so curious and important, that I would willingly have entered still more at large into it than I have done. Arduous as the task has already proved, it neither tires nor disgusts; every inquiry opens a new source for wonder, a new page for admiration and delight. To the veterinarian I need not remark, that an intimate knowledge of the structure and economy of the foot forms the groundwork almost of his practice; and that he cannot study too closely the various authorities from whence he may draw information. To him, and to the inquisitive and curious reader, I

would recommend the works of Mr. Coleman, Mr. Freeman, and Mr. Bracy Clark; writers who have professedly treated on the foot of the horse.

Sect. XVIII.

HYGROLOGY.

THE fluids of the body do not admit of a ready division; they are very numerous, and their properties various. They are mostly separated, or secreted, from that grand fluid of the body, the blood.

Blood is contained in the heart, arteries, and veins; is formed with the animal, and continues with him through life: it is circulatory and compounded, appearing red in the arteries, and purple in the veins; and contains iron, albumen, gelatin, fibrin, and water, with some other components: it has already been very fully explained.

Gastric juice is a limpid colourless fluid, yielding but few sensible qualities to a chemical test, and has a property of coagulating milk. It is secreted from the arteries of the stomach, and is in less quantity in the horse, proportional to his size, than in any other animal.

Chyle is a fluid of different appearances in different animals: in the horse it is of a milky hue; and is gained from the decomposition produced by the gastric, biliary, pancreatic, and intestinal juices, acting on the chyme; and appears intended, when so formed, to add support to the animal, by increasing and repairing the blood.

Lymphatic fluid is necessarily very various, as it is received from every part of the body; it is elaborated in the lymphatic glands, and mixed with the chyle.

Milk is a fluid secreted in the breasts of lactiferous animals, in some degree animalized, and partaking of the nature of chyle: it separates into cream, coagulum or curd, and serum or whey; and from its being possessed of phosphate of lime, has been supposed to be useful in the first formation of bone: its principal use is for the nutrition of the foal.

Pancreatic juice is a fluid apparently intended for the dilution of the chyle, and probably effecting some decomposition in it.

Bile appears first to effect a decomposition of the chyle, and then to become the natural purge to the intestines. It has some of the qualities of soap, but wants others, and is secreted from the venous blood in the liver: in the horse it is only of one kind, the pungent cystic bile being wanting in him.

Urine is a turbid yellow fluid, at times transparent, separated from the blood in the kidneys, and is apparently excrementitious. Its properties partake of the nature of the food; and its quantity is relative as well to that, as to the season of the year, and the state

of the skin. Chemistry separates several salts from it, and an animal matter: phosphorus is made from it, and it enters into several manufacturing processes.

Mucus is a general thick fluid, secreted universally upon those membranes, termed mucous. It is of a mild, bland quality, intended to keep the parts moist, to protect them from improper irritation, and to keep them *apt* to the impression of proper irritation.

Saliva is a fluid very slightly saline, whereby it gives relish to the food, and dilutes it preparatory to its passage into the stomach. It possesses some phosphate, from whence arises its disposition to form a concrete on the teeth, and earth within the glands. It is secreted from the maxillary, parotid, and sublingual glands.

Lachrymal secretion.—This does not materially differ from saliva, and is secreted by the lachrymal glands, to moisten the eye, and keep it transparent.

Semen is a fluid, secreted from the blood in the testes. It contains mucilage, phosphate and muriate of soda, and phosphate of lime; but no light is thrown upon its ultimate ends by any analyzation of it. The microscope detects animalculæ in it.

Synovia is an animal mucilage, secreted by the inner membrane of the joints, to prevent attrition.

Interstitial fluid is a vapour poured out into all the cavities, to prevent friction and an improper union of parts.

Fat is a condensed inflammable juice, spread over almost the whole body, secreted within the cells of the adipose membrane, by the arteries ramifying on their inner surface; it is of various consistencies in the different parts, and in different animals; forming grease in the horse, tallow in sheep and oxen, lard in the hog, and train oil and spermaceti in fish: it is not miscible in water, and, like oil, it forms soap with alkalies. It is a protection to parts, and a depôt for occasional inanition.

Sweat is an excrementitious fluid; in some horses of a strong smell, particularly when feeding on grass: its properties are not in reality differing from urine; and where one is formed in great quantities, the other is usually lessened.

Having proceeded thus far in my arduous undertaking, I would pause a few moments, to entreat the veterinary student, who may have followed me attentively through the foregoing pages, not to be deterred by the seeming dry and rugged detail, from entering still more deeply into anatomical and physiological investigations. Elaborate and intricate as they may at first appear, each succeeding day of study will open a new ray of intellectual light, and each new fact will forcibly impress the mind, until that which was begun with dread will end in pleasure. Upon a due acquirement of these important branches of medical knowledge, can the student alone hope to build himself a solid reputation. The possession of these will

prove a guide and way-post in all his future professional pursuits, and become the means of preventing those fatal mistakes that his fellow practitioners, less informed, will infallibly fall into; and, in fact, without a proper conversance with these key-stones of the healing art, his practice can be at best but a fortunately *empirical* one. He may possibly accumulate wealth, but he can never disseminate improvement. After more than twenty years' profession of the veterinary art, I may presume to form some judgment as to the importance of these acquirements, and may be allowed with confidence to recommend them to the strict attention of my fellow-veterinarians: in which having well grounded themselves, I invite them, with the best intentions towards their welfare, to proceed with me through the remaining pages to a consideration of the diseases of this noble animal, whose admirable qualities render a life devoted to the melioration of his sufferings, natural and acquired, not an unpleasing task.

In the following detail of maladies and their cure, I have carefully avoided idle and unnecessary theory; yet I have endeavoured to join cause and effect, and to blend the reason with the act; thereby attempting to teach the curative art by *principles* more than by *recipes:* nevertheless, the matter is so conducted, that the amateur who chooses to strip it of its systematic and artificial dress, may find a ready and safe guide to a *domestic practice.* I have borrowed very little; it might be said, comparatively, nothing: but I cannot say thus much of others; for, without fear of contradiction, it may be remarked, that many of the present popular VETERINARY WORKS owe much of that part of their matter which appears at all systematic, to the former edition of the *Veterinary Outlines.* I will not follow their example by sinking any occasional obligations I may be under, but candidly acknowledge them.

The *practice* hereafter detailed is, however, strictly *my own;* it was first formed on the principles I have recommended; it has stood the test of a long and successful trial; and is now, therefore, offered with confidence to others: and as long as it remains uncontradicted, I would invite the young practitioner to study it, and to follow it, until another presents itself in a higher degree worthy of his attention. That such may happen, I make no doubt; but if it does not occur till one more disinterestedly written than this, appears, or with more zealous intentions for the advancement of the art, it will long remain without a competitor.

PART THE THIRD.

THE

Practice of Veterinary Medicine;

OR,

A DESCRIPTION

OF THE

CAUSE, SYMPTOMS, AND MODES OF CURE,

OF THE

DISEASES OF THE HORSE,

United also with a

MORE CONCISE ACCOUNT

OF THOSE OF

Neat Cattle and Sheep.

OF
DISEASE GENERALLY.

DISEASE is a morbid affection of a part, or of the whole of the body, whereby the exercise of some of its functions is altered or suspended. The causes of disease are various; some of them are evident, others we are entirely unacquainted with. We name these causes *proximate* or *remote*, *occasional* or *predisposing*. Till the time of Hoffman, it was supposed most diseases originated in a depravity of some of the fluids: this system, which was termed the *humoral pathology*, has continued to decay from this time; and we now consider some morbid change in the solids as the most usual cause of disease; though we are still convinced that many diseased alterations in the fluids do occur. The symptoms and effects of disease, are more various even than their causes; hence appears the fallacy of any attempt at reducing them into the two states of diminished, or increased strength, of too great heat or cold, or the redundancy of dryness or moisture. Diseases have general peculiarities; such as the difference between glanders and staggers: each disease likewise has individual peculiarities; that is, the same disease does not put on the same appearances, nor produce the same effect in every subject: but these varieties are not so great in the horse as in man, whose frame is more complex, and his life more artificial. Climate produces variations also; anticor is a disease frequently mentioned by continental writers, but is here almost unknown. Inflammations of the eyes are, with us, more frequent, I believe, than with them. Some ages, likewise, are particularly favourable to the existence of some diseases: cataract more frequently attacks young horses, and strangles is almost entirely confined to them. Diseases have been divided into epidemic, endemic, sporadic, and specific.

Epidemic diseases are such as are generally prevalent among all ages and kinds of horses, at some particular time, the liability being the same throughout, and the cause equal; but the origin apparently dependent on some change taking place in the bodies of all the animals of that kind, at that time, spontaneously; or more probably produced from the action of something applied from without, as a peculiar state of the air, improper food, or miasmata in any form: these diseases may be contagious, or they may not. In epidemics, another indication is superadded to the veterinarian's practice, and that frequently the most important; this is, prevention:

to enable him effectively to undertake a preventive treatment, he must ascertain, if possible, the exciting cause. *Endemic diseases* are those peculiar to a particular climate or place, confining their effects principally to the animals inhabiting those parts: these diseases are but few in brute subjects. *Sporadic diseases* stand in opposition to the two former, and are a very widely diffuse class, and comprehend such as have a particular cause, and affect particular constitutions or ages: thus strangles becomes a sporadic disease to young horses; and the distemper a sporadic disease among young hounds. *Specific diseases* are such as are peculiar to a particular class of animals: thus farcy, glanders, and strangles, are among the specific diseases of the horse, as distemper, popularly so called, is one peculiar to dogs.

To a proper knowledge of the management of diseases, we consider the cause, symptoms, diagnosis, prognosis, and cure. The *cause* is frequently involved in obscurity; at others, by attention it may be discovered; and again, in some instances, it is evident at once. The *symptoms* of a disease are the immediate effects it produces: thus an inflamed brain, being productive of delirium and redness at the eyes, makes delirium and redness at the eyes a symptom of inflamed brain: but this does not take in any other than the immediate effect; for death is frequently a result of this disease, but death is not a symptom of an inflamed brain. From the symptoms, we form our *diagnostic* of the disease; that is, we judge of its present state. When we are masters of this, we are led to form a *prognosis*, or opinion of its probable termination. The *cure* forms the most important part, and consists in an attempt at assisting nature in her efforts to produce a natural remission of the disease. If these efforts are wanting, or inert, we promote an artificial one, or we attempt to resist the effects of the disease.

Class I.

Diffused or general Inflammation.

INFLAMMATION is a matter of the highest importance to the veterinary practitioner: its proximate causes have been a subject of investigation with the ingenious of every age; but they appear so intimately blended with the minute actions of the body, whose physiology we are but little acquainted with, that we shall probably ever remain in uncertainty on this head.

Inflammation may be considered as general or diffused, and local or confined; and it is the first of these we propose considering in this place, as more immediately relating to internal diseases: the local is more appropriate to the surgical part of the art, and with which we shall treat of it. *Diffused* or *general inflammation* ap-

pears to consist in an increased action of the heart and arteries, by which the blood is circulated with a greater velocity, accompanied with an increase of heat. Inflamed vessels retard the coagulation of the blood, and augment its fluidity, by which means the red globules fall to the bottom of the blood drawn, and the gluten or coagulable lymph, called the buff, appears on the top: and thus, when blood drawn exhibits a white surface, and sizy consistence, we say, there is an inflammatory state in that habit. In local inflammation the vessels of the affected part only are in this state, unless the part be of great magnitude or importance in the system; in which case general inflammation sometimes accompanies it; and this state is called symptomatic fever. General inflammation produces inflammatory fever: nevertheless, there appear states or circumstances in fever which are not dependent on increased action alone, and it is this something that forms the very great obscurity in our theory of fever, and which is, in fact, the very essence of the disease. Diffused inflammation, constituting fever, should be distinguished from simple increased action arising from the affection of particular parts: the former constitutes a disease; but the latter is merely symptomatic, and sometimes even a salutary effort. It may, however, in some cases, rise to such a height as to wear out the patient.

Most extensive inflammatory actions in the horse proceed to their termination sooner than those of the human, which appears to arise from the greater quantity of muscular coat found in his arteries. This gives a peculiar character to inflammatory diseases in this animal, and renders it particularly necessary that no one should form either his diagnosis, or prognosis, on the doctrine of similar affections in the human. Inflammation has different names, according to the parts it affects, assuming by this means different characters.

Inflammations terminate usually according to their violence, the causes they proceed from, the parts they attack, or according to the constitution, age, and other circumstances of the affected horse; and which various terminations may be referred to four kinds: resolution, effusion, suppuration, and sphacelus or gangrene. Schirrous cannot properly be considered as a termination of inflammation: it is an action dependent on a peculiar cause, and is likewise in the horse very seldom met with. *Resolution* consists in a removal of the cause, symptoms, and effects of the increased action; the texture and former state of the parts remaining entire. *Effusion* produces different effects. In phlegmonous inflammation there is frequently a pouring out of lymph or serum: thus in pneumonia, where the cellular texture of the lungs is affected, an effusion of lymph or serum is a very frequent termination. In inflammation of the mucous membranes there is usually effusion, which is at first thin and watery, but afterwards it becomes thicker and purulent. *Suppuration* is a state in which the vessels either secrete a fluid, called pus, or pour out one that afterwards takes on that nature. This pus either continues within the cavity into which it was poured,

till it becomes absorbed, or some part of the condensed sac is taken up, and the matter makes its way outwards and discharges. But if the increased action that should have produced one or other of these terminations, is continued to a very great extent, and the powers of the part become totally lost, it then produces *Gangrene* or *Sphacelus*; in which case the colour of the inflamed portion changes from red to pale, and from this to purple or black; vesicles are formed, containing a fluid; and finally the dead portion becomes thrown off by the living powers of the neighbouring parts, or the animal dies under the affection.

The prognosis, or the being able to give an opinion as to the probability of these several terminations, must be formed from an attentive observation of the foregoing circumstances; and this attention must of itself form the diagnosis. In resolution, not only the affected parts return to their former state; but the system at large, when generally affected, likewise returns to its original standard: this is evinced by the tenseness and swelling subsiding; by the pulse, that was full, hard, and quick, becoming soft and moderate. Effusion, is indicated by a remission of the increased action, the pulse usually also becomes smaller; but if the effused fluid is considerable, it may be observed to be likewise irregular: there is also frequently an obstruction to the functions of some of the organs in the neighbourhood of the effusion. When suppuration takes place, the symptoms of irritation and pain cease, the pulse becomes softer, and fluctuation may usually be felt. And when gangrene follows inflammation, the pain likewise subsides, and the pulse becomes also softer; but it likewise becomes weaker, and the strength sinks; and it is particularly characterized by these effects taking place abruptly.

In addition to the foregoing terminations, there is another that now and then takes place naturally; at other times it is brought about artificially. Two distinct inflammations are seldom found in parts situated near to each other: but a part in proximity may become susceptible of the increased action in a superior degree to the part first affected; in which case, as it takes on the inflammation, it very generally produces the effect of removing it from the other; and this termination is called *metastasis*: but as this is much more frequent in erysipelatous and arthritic inflammations, to which the horse is not very liable; so it is seldom that this termination takes place naturally in him; the most common instance, however, of this, is in what is termed moon blindness, wherein one eye will sometimes become suddenly well, and the other affected. But an artificial metastasis is frequently produced in the horse with the utmost benefit; thus, in a pneumonic state of the lungs, by raising an active inflammation on the sides of the chest externally, by fire, by caustic, or by blisters, many horses are saved; for a removal of the affection takes place from a part essential to life, and with which the system sympathizes largely, to a part not essential to life, and with which the constitution does not so intimately sympathize; and which likewise is more able to bear it.

In the inflammatory affections of internal and essential organs, and which are those to which we particularly wish to apply these remarks, resolution is always to be strenuously attempted; and to this termination all our directions of treatment will tend; referring others to the description of the local and more confined inflammatory affections.

In attempting the reduction of general or diffused inflammation, the cause, if still existing, should be attended to, and removed, if possible: the increased action of the vessels should then be subdued, by diminishing their contents by general bleeding; and this should be continued so long as the action of the heart and arteries continues inordinate, and the muscular strength unimpaired. Heat increases inflammation; speaking generally, therefore, the animal should be kept cool; but when, from a wish to promote a counter-determination to the skin, warmth is advisable, we shall notice it. Costiveness is favourable to inflammation, the body, in such case, should be opened by laxatives or clysters; but active purging is not often prudent in great inflammatory affections of the horse. Every cause of irritation should be removed, for irritation accelerates the action of the arterial system. It is most important that the circulation should be rendered equal throughout the body, unless we wish to procure an artificial metastasis. Those remedies should be made use of that are found most readily to act, directly or indirectly, in moderating the action of the heart and arteries, as antimonials, foxglove, nitre, neutral salts, and diluting liquors. Nauseating medicines have a remarkable effect on the action of the vascular system in some subjects; and though we cannot avail ourselves of this means in the horse, we may in the ox and sheep. A moisture of the skin should be encouraged, but seldom forced. Stimulating medicines, as cordial drinks, spicy balls, much clothing, and hot stables, should, speaking generally, be avoided. These are the more general indications of cure of diffused inflammation, and that of internal and essential organs; and we shall now proceed to speak of the several kinds separately.

Of Fever *Generally.*

The subject of fever is always an intricate one, but in the horse its intricacy is infinitely less than in man. Some ingenious practitioners do not even believe that it ever exists in the former as an idiopathic, simple, or primary disease: but that all febrile complaints are in this animal symptomatic of a local inflammation of some important organ. That fever in the horse does very seldom exist as a primary affection, is certain; and that it still less frequently remains in an original idiopathic state, without being transferred to some one particular organ, is even more certain. Nevertheless, the attentive veterinarian, whose opportunities for observation are exten-

sive, will now and then meet with cases where what may be called the *specific nature of fever* shall be present. To perfectly understand what is here intended, we must again refer to what has been said on the subject of general inflammation; where we have remarked, that 'there appear *states* or *circumstances* in fever which 'are not dependent on increased action alone; and it is this *some-* '*thing* that forms the very great obscurity in our theory of fever, 'and which in fact constitutes the very essence of the disease.' (*Vide p.* 318.) That fever is a disease *sui generis*, having a specific character not altogether dependent on the heightened action of the vascular system it creates, is pretty generally acknowledged, and tolerably easily proved: one very familiar instance seems to present itself. Pneumonia or inflammation of the lungs, even when very violent, and producing alarming symptoms, does not produce so much absolute present prostration of strength in a horse, as an attack of epidemic catarrh, comparatively mild, and attended with little danger. The reason is, that, let the former be as violent as it will, it is still local inflammation, and attended only with increased action, being unaccompanied with other fever than that we term symptomatic; and which is, as has been before said, a state dependent on the mere increased action of the blood vessels; and in fact may be rather considered as an effect than a cause. But, on the contrary, as in true or primary fever, one of its strongest characteristics is an early and universal muscular weakness; so in the epidemic catarrh, which is evidently a true febrile affection, having superadded the increased vascular action of an extensive surface of mucous membrane; a comparatively mild attack of it produces a more speedy and evident debility of the muscular powers, than a much more serious affection that is purely local; even though the symptomatic fever should be much higher than that of the epidemic.

It is also very common to deny the existence of a putrid tendency in the fevers of horses; or rather that any original disposition exists in the inflammatory affections of the horse to assume that type we characterize by the term typhus: but if it is granted that the horse is not wholly incapable of generating or receiving a disease having the specific character of fever (and from what has been brought in proof, I think it must readily be); then, this being granted, it surely will be difficult to deny the putrid tendency of some of the fevers of horses; seeing that all fevers have many characters in common, and that from analogy it may be readily assumed, that the animal, who is liable to a mixed febrile complaint, such as we describe the fever of the horse to be, shall almost necessarily be subjected to that type of fever so little remote from it. But one fact is worth all the theory in the world: in proof, therefore, it may be added, that the observant practitioner need not be reminded, the epidemic catarrh frequently produces œdematous swellings along the chest and belly, or over the head, or around the joints: in some cases buboes exist, or very large glandular abscesses form: in others a sanious, stinking, and bloody ichor flows from the nose, and, in the end, the whole

cellular membrane become suffused with a serous fluid termed water farcy. All these are common appearances, singly or conjointly, in aggravated cases of the epidemic catarrh; and are also now and then met with at the close of that fever which appeared to commence as an idiopathic affection. It may be, therefore, safely affirmed, that the unprejudiced observer, who has once only seen a horse sinking under a disease accompanied with the above appearances, will not hesitate to allow his being capable of becoming the subject of putrid fever. In the malignant epidemic that sometimes visits horned cattle, the putrid tendency is still more evident and notorious.

Under these views of the subject I shall proceed to describe the fevers of the horse, into, first, Simple or Idiopathic fever, approaching in some measure, but not wholly, to the synochus of the human. Secondly, the Epidemic or Catarrhal fever. Thirdly, the malignant Epidemic, or malignant Catarrhal fever, which perhaps may, to superficial observers, be considered only as an aggravated degree of the former; but when it is considered, that in some years the appearances which characterize its malignant and putrid tendency are more striking and more generally diffused than in others; then we are warranted in considering it separately. The fourth and most frequent fever of the horse is the Symptomatic, or that febrile appearance that accompanies great local affection or inflammation of some vital and important organ.

It has been observed, that man, by his luxurious habits in the present state of society, lives up to the full extent of his vital powers; and that thus, when disease arrives, these cannot be pushed any further, but he soon falls into a state of diminished energy, instead of one of increased strength; and to this it may be attributed, that we now very seldom meet with a case of pure inflammatory fever in the human subject. It is not unlikely, also, that in a less degree the same may be attributed to horses; at least the majority of those the veterinarian will be called to, live, like man, a life of art: much is required of them, and their efforts are rendered, if I may so express myself, artificially strenous by a large portion of nutriment, so as to keep in them also the vital powers up to, or above, par; and, therefore, neither in them is a fever purely inflammatory to be met with, at least it never remains long so. But in the horse there appears another and much more cogent reason for this; for in him the very great strength of the arterial system causes all his febrile affections to assume a character of considerable action in the first instance; but as, in this case, the powers must be necessarily sooner exhausted, so they very commonly flag early, and with very little previous warning; great debility at once succeeding to the most inflammatory diathesis.

From this peculiarity in the fevers of this animal results a necessity for a constant attention, on the part of the veterinarian, that these sudden changes may be detected: for as it is essential that, in the first instance, a cooling, mitigating, and refrigerant plan should be pursued, so long as active inflammatory symptoms remain; and

as a change into direct debility is often sudden and unexpected, so it is also equally important, in such an event, not only to pursue a lowering treatment no farther, but also promptly to counteract this debility, by such means as tend to keep up the bodily functions without hurrying or irritating them.

In this order, therefore, I shall proceed to a consideration of the fevers of horses; and it may be here remarked, that those of oxen and sheep in no wise differ materially, except, perhaps, that a putrid tendency is rather more apparent in their inflammatory affections, than in those of the horse.

COMMON OR SIMPLE FEVER.

Latin Name. *Synochus cum Synocha.*] French Name. [*Fièvres.*

It has been before stated, that the fevers of horses are so generally united with an appearance of topical affection, that many veterinarians deny altogether the existence of this disease as a primary affection: but if, as was then remarked, it is allowed that the catarrhal affection partakes of the specific nature, or the true character of fever, then the capability of the horse for this complaint is beyond contradiction: it may be here further added, that though fever, without distinct local affection, is a rare occurrence; yet that it does now and then occur, the experience of the observant practitioner will convince him. Indeed I am disposed to think, that it is not so much the extreme rareness of its existence which has led to a belief that it never occurs, as that, from some peculiar tendencies in the constitution of this animal, the disease very usually remains but a little time as *general* fever; but becomes very soon transferred to some one part, commonly to an important organ: and it may be added, that four times out of five the lungs prove the subject of it. In my own practice I have certainly met with this fever; and I am convinced that many inflammations of vital organs begin by an attack, not local, and confined to that immediate part, but one which exists, in the first instance, as a general diffused inflammatory action of the vascular system at large. Every practitioner is aware that it is common, when a horse is observed at the very first approach of illness, to rouse him by various means: among horse-dealers and job-men, when the epidemic of the spring is prevalent, it is the custom to watch their horses narrowly, and to pursue some plan of this kind promptly; after which they frequently observe no more of the complaint: but if the first cold fit is passed over without attention, a hot stage generally succeeds; in due time the horse again shivers, his hair stares, and he becomes subjected to other symptoms of illness, and the disease is then fully formed. The means pursued for this end are various, but they are all such as tend to rouse the powers into increased action, and into such a degree of it

as shall be greater than the increased action of the complaint; and it is upon justly appreciating the two degrees of action, and upon pitting the forced one against the diseased one in sufficient strength, that consists the salutary effort. Now, were such a plan to be put into practice, when a topical inflammation of some important and vital organ had actually taken place, it would most undoubtedly greatly aggravate it: but as in diffused inflammatory action, constituting fever, there is a *specific* character, not wholly dependent on the increase of the vascular power; so the production of an artificial action, greater than the diseased one, in the early stage, will sometimes overcome the febrile one. I think this a sufficient proof that the inflammatory complaints of horses sometimes originate from true fever, translated afterwards from an universal to a particular affection.

In the first edition of this work it was stated, that Common or Simple fever might be more properly designated by the term *Synochus cum Synocha*, it not having debile or putrid characteristics sufficient fully to entitle it to the former; and certainly, not being so purely inflammatory as to merit the latter. Subsequent experience has confirmed the propriety of this consideration of the matter; and the very few instances that do occur, shew, that though not essentially differing from the human mixed fever, it yet has a greater proportion of synocha entering it. It also appears not to be peculiar to any age; neither is it more prevalent at one period of the year than another, except we allow that the catarrhal fever, as well as some topical affections that take on an epidemic form, are produced from it.

The cause of this fever always, I believe, originates in a plethoric state of the blood vessels; but the circumstances producing this state may be various. Perhaps one of the most common may be the sudden access of cold, as the turning a horse out to grass without preparation, or other exposure to a decreased temperature. Another proximate cause may arise from any imprudent alteration in the habits of the animal, as an immediate removal from grass, or a straw yard, into a heated stable; or from the meagre diet of the one, to a full allowance of corn: either of these might be sufficient to produce the complaint, but when both operate together it is still more likely to occur. Great fatigue may also produce it, and is, I believe, not an unfrequent cause. A long deprivation likewise from either food or water, particularly the former, may bring it on; but an alternation of cold with heat is certainly the most common of the existing causes of this as well as of most of the inflammatory attacks of the horse. The vessels of the skin seem in these cases to be first acted on, and probably it is the reaction of the heart and arteries upon this state that constitutes the primary attack; the keeping up of this reaction is probably dependent on the *specific* nature of the complaint.

The *Symptoms* that present themselves are, first, a shivering fit: nine times out of ten the complaint commences by a staring coat,

with extremities, muzzle, and ears cold, accompanied by a strong shaking of the skin, which lasts a longer or shorter period as the attack is more or less violent, or as means are more or less early employed to bring about a reaction of the capillaries. If, as has been observed, *artificial* means are judiciously used to overcome this first rigor, the specific action sometimes gives place to the one artificially promoted, and no more is seen of it: but should this be neglected, to the cold fit succeeds a very considerable degree of heat, frequently followed by partial sweats, and always accompanied with quickened, but seldom with laborious, breathing. If the pulse is examined during the cold fit, it will be commonly found but little increased in frequency or fulness; but as the horse becomes hot, it is observed much quicker, with a corded, hardened feel in the stroke that sufficiently shews the struggle between the blood and its vessels. There is likewise generally present in this fever much restlessness and uneasiness, betokened by a shifting of position, and frequent laying down and getting up again; but there does not appear much pain, though I have observed the bowels apt to be uneasy and flatulent, which is known by the rumbling noise commonly present in these cases. The inner surface of the eyelids is always increased in its redness, and the inside of the nostrils also; but not in an equal degree to what occurs in the epidemic fever, and still less than what is present in pneumonia. The skin and extremities vary in their temperature, being sometimes hot and at others cold, and the coat feels universally harsh and unthrifty. In the early periods of the complaint there is often considerable thirst, for all the secretions appear diminished; the dung, therefore, is dry and hard, and the urine high coloured and small in quantity.

This forms the first stage of the fever, and thus much of it, I conceive, occurs more frequently than is generally supposed; but it is very common for it at this time to sink its specific character of true fever, into a purely inflammatory, but confined, state; that is, that immediately succeeding to this first stage, an attack commences on some particular organ, as the brain, lungs, bowels, kidnies, and, in some instances, probably the feet; in all which cases it ceases its primary character, and its febrile symptoms become secondary and symptomatic. The preference it may have in these instances for any one organ over another, is not easily accounted for; but it may be connected with local circumstances, particularly with such as have had a tendency to produce an unusual determination of blood to a part. Violent and long-continued exercise is observed to give this disposition to the lungs, from the very great quantity of blood forced through them during exertion. Water, thrown over a horse when hot, is very apt to bring on a state of the bowels, predisposing them to inflame. A heavy and awkward rider, travelling a great distance, subjects the kidnies to such injury, that they often require but little additional stimulus to take on nephritis: and it is equally notorious, that severe riding in the snow, or the custom of washing

the feet when a horse is very hot, will produce a tendency to acute founder, that may be brought into activity by a slight attack of fever translated to these parts. It remains to be noticed, that, independent of these purely local attacks, there is great reason to believe that this fever not unfrequently degenerates into the catarrhal epidemic; and I am inclined to think, that many of those cases that commence with a simple rigor, and which are often prevented from proceeding farther by simply overcoming this, are of this nature.

But should none of these attacks occur, but, on the contrary, should this fever remain, after the first stage, purely idiopathic, which, though very seldom, does now and then happen, a series of symptoms supervene seldom invariably the same in any two subjects, but with sufficient general characters to describe them as follows:— The pulse continues to have a corded feel, but loses still more of its fulness, and increases in quickness; the skin also becomes moist, the eyes weep, and the nose and mouth secrete either a thin or a viscid mucus: now and then, however, the mouth continues hot and dry throughout; the urine, which was before high coloured, and in small proportions, is gradually secreted in larger quantities, and becomes of an opaque colour. It is not unusual, also, for the hind legs to swell, and sometimes likewise swellings appear about the head, the throat, or along the chest and belly; and when these occur early in the complaint, I have usually in this, and in the epidemic catarrh, considered them rather as favourable indications; that is, I have found fevers in the horse, so accompanied, more tractable than others without: but I think I have observed the reverse of this to be the case in the fevers of horned cattle.

What I have just described may be considered as constituting the middle and principal stage of this fever, but in which it seldom remains more than two or three days at the utmost; for either succeeds a gradual abatement in the frequency of the pulse, but more particularly it becomes softer; the countenance looks more lively; the muscular weakness rather increases, while the irritability lessens; the secretions also return to their natural state; the mouth feels cool and properly moist, and the heat of the body becomes lessened, as well as regular and equable throughout; slight symptoms of returning appetite likewise appear: under which circumstances, though the weakness may be extreme, yet a resolution of the fever is formed.

Or, on the contrary, instead of these favourable appearances there may succeed either great restlessness and watchfulness, or a constant drowsiness, with an increase in the frequency of the pulse from 100 to 120 in a minute, particularly if irregularity is joined to its quickness; and still more, if to these are added convulsive twitches of the skin of the neck and flank, and a grinding of the teeth, then great danger is to be apprehended, and a fatal termination is likely to occur: and if, in addition, the horse chews his hay, and then lets it fall, as though insensible of its escape; if also profuse purging comes on, or the breath becomes offensive, it may be regarded as

certain. In such cases, an extreme prostration of strength succeeds, a deadly coldness of the extremities, a laborious and quick respiration, cold sweats, and death soon closes the scene.

It must be remembered that the whole of the above symptoms may not be present in every case, and also that in some, other appearances may be added to those we have particularized; yet it is no less fever for these varieties: and as it will be found by the practitioner that this fever is one that is compounded of the inflammatory and low types; so also it may be remarked, that the proportions of these will vary in different subjects, according to the causes producing it, the temperament, the age, the season, and, above all, the condition of the horse: perhaps also, in no small degree, it may depend on the mode in which it has been treated on its first attack.

Prognosis.—This must be formed from the degree of inflammatory diathesis manifested in the first instance; the disposition of it to lessen or to increase in the second stage; and the capability of the patient to bear the violence of the attack; which consideration involves the particular circumstances under which the individual labours.

The Cure of Simple Fever.—It has been before remarked, that if the first rigor is observed, and means are taken to overcome this artificially, by rousing the flagging powers under the influence of the cold fit, that the future progress of the disease is often arrested. It is but seldom, however, that sufficient attention is paid to detect it at its outset; and without the matter is attended to on the first cold fit, it would be useless, and even worse than useless, to attempt any thing of this kind afterwards. But as in cases where others have been attacked in a similar manner, the attendants may be sufficiently aware of the commencement of future instances; so it may be proper to point out the means that may be safely used; but only on the very first attack of simple shivering, the horse having been previously well. In such a case, as soon as observed, clothe warmly, and immediately take out and trot briskly for ten minutes only; remove into the stable, and rub well over by the assistance of two or three persons: having done which, give the following:—

Sweet spirit of nitre (*nitrous æther*) . . one ounce,

Or, in default of this, substitute

Spirit of hartshorn (*carbonated ammonia*) six drams,
Warm ale . . . . . a pint.

If, after all this has been done, the shivering should still continue, again trot briskly for ten minutes more, then bleed liberally, rub the body again all over; after which clothe as before, and keep the stable warm. In two hours reduce the clothing and heat to their former state, and if the disease is arrested, no more will be seen of it: but should other symptoms arise that betoken a continuance of the fever, proceed to treat as follows, bearing in mind that the rules laid down presume no blood has been drawn; consequently, if it is

otherwise, and blood has been drawn, the quantity previously taken should be subtracted from the account: if not, on the first appearance, or as soon after as possible, bleed in a full stream to the amount of three, four, or five quarts, regarding the age, size, and condition of the horse. The blood taken away should be suffered to settle undisturbed in the vessel it was drawn in: it is unnecessary, it is presumed, to direct that a vessel should be always made use of, and the horse by no means permitted to bleed at random on a dunghill, or the ground. When the blood has been suffered to settle quietly, if there is much inflammatory action going on, it will most probably appear sizy or buffy at the top of the coagulum; that is, the cake swimming in the middle of the fluid part, will have a tough yellowish crust over it; should this appearance exist to a very considerable degree, and the pulse remains full and hard, it warrants a repetition of the bleeding, particularly if the other symptoms do not moderate. As soon as blood has been drawn, the horse should be back-raked; after which a laxative clyster may be thrown up. (See *Materia Medica.*) The following may be given two or three times a-day, according as the case is more or less urgent:—

Emetic tartar (*tartarised antimony*) . . two drams,
Nitre (*nitrated potash*) . . . . . three drams.

Mix with a pint of gruel, or make into a ball with honey.

Cordial medicines in this state of the disease must be most carefully avoided; the food also, if the horse will eat, should be of the most cooling kind, such as hay, bran mashes, &c. with bran water or thin gruel, as drink, which are the only aliments that ought to be allowed; unless indeed it should happen to be in spring or summer, when any esculent vegetable may be given in moderate quantities, as tares, lucerne, sainfoin, &c. The heat of the stable should be so regulated, that it may be temperate only, but never hot: heat increases action, and hence augments the disease; and as the fevers of horses seldom terminate by sweating, so keeping them hot is the less advisable. The clothing should also be moderate; in summer, a single linen sheet is sufficient: nor should the surcingle be tight; it must be evident, that an animal beating at his flanks with accelerated respiration, can ill bear this confinement. A free ventilation of air in the stable ought to be encouraged, the litter should be plentiful, and every noise and cause of irritation as much as possible removed. The body should be often examined by the attendants, and when any parts are found cold, or even cool, they must be hand rubbed, to encourage an equal heat, and a circulation through the capillaries: for it is certain, that as much as the cold fit is lessened, the subsequent hot fit is proportionally diminished. Should the legs, in particular, become cold, let them be well whisped, and then wrapped up in flannel or haybands; and as often as the cold fit returns, apply the friction for the above reason.

This appears the proper treatment of the first stage; but the con-

tinuance of this, or the adopting of another mode, must be indicated by the succeeding appearances, and which must therefore be carefully observed; and as the changes in the type of this disease are often very sudden, the animal ought to be seen by the medical attendant at least twice a-day; never less than once; and, if possible, much oftener: for should the inflammatory symptoms suddenly cease, and debility succeed, it might happen, from the practitioner seeing the animal once in two days only, that the antiphlogistic treatment might be continued during this period to the destruction of the horse: and it will be generally found, that the stronger has been the action of the heart and arteries, or the higher the inflammatory symptoms have run during the first stage, the greater exhaustion is produced during the succeeding progress of it.

The former treatment being pursued on the first day, if, on the succeeding one, together with the quickness, much of the febrile hardness remains in the pulse, the other symptoms remaining in full force, two or three quarts more blood may be drawn from the opposite side. The strength of the pulse should be a greater guide in this particular than the hardness; for though this latter indicates an inflammatory action in the vessels, yet we must not in fever, particularly, if it at all approaches to the weaker and mixed kind, continue bleeding till the whole of the hardness is removed, or so much debility will otherwise be brought on, that the animal will be unable to struggle against the specific part of the complaint; but so long as, superadded to hardness, there is considerable strength in the pulse, we may safely bleed in moderate quantities. It will, however, rarely happen that such a fulness will remain on the third day, as to warrant a repetition of the bleeding beyond that time, if the previous treatment has been energetic and prudent; and it may be remarked, that almost every thing depends on the mode pursued the first two or three days: an opinion of the disease should not be hastily made up, but the moment that it is formed, the treatment proposed should be pushed with vigour, and no time lost. On the second or third day, if the symptoms run high, the medicines before ordered should be now given three times in the day, and once during the night; or they may give place to the following:—

White antimonial powder (*James's powder*)	two drams,
Nitre (*nitrated potash*)	three drams.

Make into a ball, and give night and morning: and in such a case give also, during the intermediate time, some linseed tea, in which cream of tartar has been dissolved: but should the former powder be continued, and that three times a-day, then the addition of the cream of tartar might gripe. During the complaint, it is of the utmost consequence that the bowels be kept open, but active purging should by no means be encouraged; if, therefore, the body has not been relaxed by the clysters, give by the mouth a *laxative*, such as are prescribed under that head in the *Materia Medica*, and repeat till the passages are slightly relaxed; but do not push it be-

yond this: and when this has been effected, return again to the fever remedies; warm gruel, bran mashes, and clysters, will be equal to keeping the bowels free from constipation in future. In case the nitre should be found to gripe, or occasion profuse staling, omit it, and substitute cream of tartar in its room; or should the thirst, heat, and restlessness increase, and the pulse become quicker, but less strong; in such case refrain from the former remedies altogether, and substitute the following:—

Mindererus's spirit (see *Mat. Med.*) . .	four ounces,
Tartar emetic (*tartarised antimony*) . . .	half a dram,
Strong camomile tea	six ounces.

Give this every six hours; and if any sore throat, soreness of chest, or disposition to cough, should appear, add four ounces of simple oxymel to the drink. See *Mat. Med.*

If the legs swell violently; but more particularly, should there be shifting swellings of the head, throat, or belly, a rowel may be very properly inserted in any part of the body; and the same may be done, should there be any appearance of topical affection of any vital organ; unless, indeed, the attack is a very decided one, in which case, blistering, and the other means recommended for these cases, should be pursued: but when no swellings appear, I do not recommend rowels in this fever; and when no local affection seems to exist, but the inflammatory diathesis remains *general* and *diffused*, neither would I blister; for *blistering*, without topical affection, proves a source of irritation; and, in these cases, increases action, instead of diminishing it, and therefore, if at all admissible in this fever, is best adapted to the weaker types of the disease, as when the horse becomes very dull and languid, and the whole powers flag: but this caution is not meant to apply to local inflammations, as those of the lungs, bowels, &c., where external stimulants are of the greatest service, and chiefly to be depended on.

During the continuance of the complaint, particularly in the early stages of it, the animal should not be urged to eat, as is often done by grooms and stable attendants; for the stomach partakes of the want of muscular and secreting energy with the rest of the parts, and hence food, when it cannot be digested, becomes a foreign body, and a cause of irritation to the stomach, and through the medium of that to the constitution in general. But this caution applies only to the very first stage of the complaint; by some it may be thought altogether an unnecessary one, because the horse is seldom inclined to eat during his illnesses: but when it is considered that many persons, if the appetite is a little palled with hay, will press oats, or even beans, to excite the animal to eat, then the propriety of this caution will be evident; but, as before noticed, it only refers to the first stages of the disease; for after this, particularly where the weakness is considerable, the horse should be encouraged to eat by selecting the sweetest hay, sprinkling it with water, and offering a lock at a time by the hand. Clover-hay will sometimes also tempt the appetite, and green meat should be carefully sought

after. Malt mashes may also be given, and if all food disgusts, then gruel made thick by boiling should be poured down the throat with a horn, and also thrown up as clysters.

Under this treatment it may be expected that the animal will begin to look more lively, the pulse will become softer and less frequent, and the appetite give tokens of return. But if, on the contrary, he becomes more dull and heavy, starting sometimes, and dozing at others; if the pulse becomes quicker and threadlike, with liquid stools, and profuse staling, then great danger is present, and the treatment must be very active to prevent a fatal termination. In such a case, give the following, every four hours, in conjunction with some gruel:—

Powdered camomile	one ounce,
Tincture of opium	three drams,
Mindererus's spirit (see *Mat. Med.*) .	four ounces,
Sweet spirit of nitre (*nitrous æther*) .	half an ounce.

Or the following may be substituted where a ball is preferred, but I should in preference recommend the drink:—

Powdered ipecacuanha	one dram,
Powdered camomile	two drams,
Camphor and opium, each . . .	one dram.

Mix into a ball with honey or other matter.

Should the symptoms become even more urgent; should the thirst altogether cease, the tail become raised and quiver, the pulse irregular, the mouth smell fœtid and produce a glairy mucus; and, particularly, should symptoms of œdema, or water farcy, appear; add to the drink, in lieu of the powdered camomile, one or two ounces of Peruvian bark; or if this is objected to on account of the expense, two or three ounces of willow or oak bark, in powder, may be substituted.

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Inflammatory Fever *in* Neat Cattle.

Oxen and cows are subject to a highly inflammatory fever that usually terminates by a critical deposit on some part or parts. This complaint is called, by farriers, cowleeches, and graziers, by various absurd names, which are prevalent in degree as they stand in order: *Black quarter; Joint felon; Quarter evil; Quarter ill; Shewt of blood; Joint murrain; Striking in of the blood;* and *Black leg*. It is more common among two or three year old cattle than those of any other ages; but it sometimes attacks older beasts. Any cause producing an inflammatory diathesis will occasion it; among the most frequent is a change of food from a meagre to a more nutritious one, and hence it is very common among the droves brought from the north into the luxurious pastures of the southern, midland, and western districts. It is sudden in its attack and rapid in its progress, presenting highly inflammatory ap-

pearances at first, which as quickly degenerate into a low and putrid type; as indeed do most of the inflammatory affections of neat cattle and sheep. The first symptom usually betrayed is a dull heavy countenance, with red eyelids and nostrils, a pulse quick and hard, and the dung either retained altogether, or hardened and in small quantities. The appetite is usually lost, and the animal is sometimes disposed to doze, but more often to increased watchfulness. On the second day a critical deposit takes place, and which terminates the inflammatory action. This deposit is various in different subjects; in some, it proves an universal suffusion of bloody serum throughout the cellular membrane; in others, inflammatory phlegmonous tumours form on the joints, or on the back or belly. From the putrid tendency in the complaint, a quantity of gas is likewise let loose within the cellular membrane in some instances, which produces a crepitation or crackling under the skin, exactly similar to what appears in veal when blown up by butchers. Under these appearances, unless speedily relieved, the animal sinks; and it may be remarked, that after the critical deposits have formed, the disease assumes a more putrid type, and proceeds in its malignity in the same degree of rapidity that the early stage ran in inflammatory action.

The Treatment.—When the disease is detected before the skin crepitates, or before swellings have formed, bleed freely to the amount of three quarts, and immediately give a brisk purge: but, if the critical deposits have been made, be more sparing of the lancet, and also of the purging; unless the pulse should still remain very full and strong, in which case the purge may be administered; and when that has operated, proceed to give the following night and morning:—

Yeast from beer . . . . . six ounces,
Mindererus spirit (see *Mat. Med.*) . four ounces.

Mix.

The swellings may be rubbed also with yeast, which will be found to have a very salutary effect on this complaint either outwardly or inwardly. The emphysematous air is sometimes let out with a penknife or lancet; but this practice is not, I think, a good one, unless the swelling is very extensive; then indeed it may be done, but by very few and very small openings.

I should be thought to have made an omission if I did not mention a popular remedy for this complaint, which is to divide the claws with a scalpel or knife, and with a tenaculum to draw out one of the veins of the lesser pastern, and divide it.—*Credite vult.*

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Inflammatory Fever *in* Sheep.

Sheep fever, *Higham striking*, or *Blood striking*; are all names used to characterize a species of sudden inflammatory attack to which

these valuable animals are liable. The treatment in nowise differs from that of neat cattle, making allowance for the different proportions of the animal.

THE EPIDEMIC CATARRHAL FEVER.

Catarrhus.] [*Courbature, Morfondure.*

THE catarrhal fever, which is also popularly called *Distemper*, may attack horses at any time, and almost under any circumstance; but it is infinitely more prevalent at some times, and under some circumstances, than others. During the spring months, and sometimes, though less frequently, during the autumnal also, it becomes very prevalent: in some years most particularly so; and it then rages in a truly epidemic form. No age is exempt, but the number of young subjects attacked is infinitely greater than that of older ones. The horses of large cities and crowded towns are certainly more obnoxious to it than those less confined; nevertheless it is sometimes also sufficiently common among these, raging every now and then in so truly an epidemic form, that the liability becomes nearly the same throughout all kinds and classes, with the exception before noticed, that the young are much more the objects of its attack than the old. The spring months are particularly favourable to its production, and these are aided materially by a variable state of the atmosphere, as great and sudden changes from dry to wet, from heat to cold, and still more certainly if accompanied with a long continued easterly wind. It has been disputed whether it is contagious or not, and this point is by no means easy to decide. When the disease is generated from the mere application of cold, it certainly appears but little contagious; but when it rages as an epidemic, and is very prevalent, it then certainly exhibits contagious characters; though, even under these circumstances, many aged horses fully within the sphere of its action will often escape: nevertheless the liability is so generally diffused among all kinds at such times, as to be most easily brought into action, and it is to this liability that it principally owes its character of contagious.

Its real nature has been hitherto much mistaken: among the older farriers it has been usual to consider it as a *cold;* and in most of their books it passes under either this term, or that of *morfoundering*, from the French; among whom also it was formerly but little better characterized, being by some described as a flux of matter from the nose, the effect of cold; and by others, still more erroneously, as a species of chest founder, *courbature*, but which is merely an inflammatory rheumatic attack on the muscles of the chest. It is called, also, courbature by La Fosse; but he does not fall into the error of considering it as chest founder, but describes it as a species of inflammation of the lungs, apparently unmind-

ful of its epidemic character, and of its partaking of the specific nature of fever*. Later French authors, however, describe it as catarrh, or cold, accompanied with fever, and raging sometimes as an epidemic, and seem not altogether unmindful of its specific characters.

But the mistake that is most frequently made by practitioners, is that of confounding it with the purely topical affection of the lungs, pneumonia; and an error of this kind is a very likely one among those of only moderate experience, from the symptoms of the two on a slight observation appearing very similar; and, also, because the complaint is almost invariably accompanied with some actual chest affection; or, at least, in every case the bronchial passages are affected. But it is of considerable consequence to distinguish it from simple inflammation of the lungs; as, from what follows, it will be found that there are some important differences to be pursued in the treatment; for, in the catarrhal fever, if the bleeding and other parts of the lowering system are carried too far, the consequences are almost surely fatal: while, on the contrary, in pneumonia this plan, particularly in the early stage, can hardly be prosecuted too vigorously. To an attentive observer, such a mistake is not likely to happen; many circumstances will present themselves that may serve as a guide to distinguish between them. Inflammation of the lungs usually commences with a short dry cough that does not appear to distress the animal much at first: this sometimes exists two or even three days before any violent symptoms appear; and under any circumstance this short dry cough very usually precedes any cold rigors: indeed, in pneumonia there is often no regular cold fit observed; at least, no general rigor of the surface such as so frequently proves the precursor to catarrh; but a stupid appearance, heaving of the flanks, and the extreme coldness of the extremities, alone first attract the attention, when the disease attacks with violence. In the epidemic fever, on the contrary, there very usually is first observed a rigor or shivering fit of the whole surface of the body. It must however be allowed that this, though very general, is not invariable; for, in some instances, the other symptoms are preceded by a weak cough; but even then this cough will be a different one from that which precedes the full attack of pneumonia: for it will be more sonorous, and though probably the sound is deceptive in this respect, yet it appears to produce the idea of its coming deeper, if I may so express myself; the cough also usually in catarrh seems to give great pain, and is accompanied even from the very first with an evident soreness of the chest; and which early soreness is alone a characteristic: it is sometimes so consider-

* La courbature est a peu près la même maladie que la pleuresie: c'est une inflammation du poumon, causee par une fatigue outrée, ou un travail forcé. Le cheval a une fièvre considérable, tient la tête basse, est dégoûté, respire avec peine, tousse et jette par le nez une humeur glaireuse, quelquefois jaunâtre, quelquefois sanguinolente. On donne quelquefois le nom de courbature à une fatigue ou lassitude simple; mais ce n'est pas ce que j'entends ici.—*La Fosse; Dict. d'Hippiatrique.*

able as to make the horse stamp when he coughs with a sort of petulance at the pain he feels. In some cases the soreness exists throughout the whole nasal and bronchial passages, when, of course, the pharynx will become affected; and as all the mucous membranes, either in continuity or even in contiguity, take on a disposition to partake of the inflammation of the other, so it is very generally accompanied with sore throat and a great difficulty in swallowing: liquids are altogether refused, or sucked in slowly and with caution; the hay is deliberately chewed and then thrown out, or, as is said, the horse *quids it:* but it is very seldom that any thing of this kind occurs in pneumonia. Another evident distinction between these two diseases arises from the early weakness that takes place in the catarrhal fever; for even on the second or third day, those around, if not used to the complaint, will be surprised to find the horse stagger and reel as though he had been ill a week: the reason of which appears to be, that here, though the inflammatory state is more general and diffused, yet it partakes of the *specific* character of fever, the particular tendency of which is to produce an early and invariable prostration of strength: but in pneumonia, though the inflammatory action is much greater, yet it is simply increased action, with a fever purely symptomatic, and unmixed with the specific character of idiopathic fever, and therefore not accompanied with so early a debility. It is not here meant that early debility does not sometimes come on in inflammations of the lungs, but such is only the case when the attack is exceedingly violent, and when the strength fails from an early defect in the organic structure of the lungs; they no longer being capable of giving the blood its vital principle, in which cases prostration of strength must ensue, but then all the powers equally fail; while, in the epidemic, the weakness appears muscular, and in no respect correspondent with the degree of violence of the symptoms in the complaint. In catarrhal fever the pulse is also quickened and febrile, but is devoid of that oppressed feel so usual in inflamed lungs: the nostrils also, though sufficiently red and inflamed in the former, yet have seldom that intense colour bordering on a purple which is present in the latter; and though the extremities may be cold in catarrh, they are never so intensely so as is frequent and almost invariable in pneumonic affections of the topical kind. From all these distinctions, it is hoped the practitioner may readily learn to detect either the one or the other: it remains only to remark that this fever may be sometimes confounded with strangles, and it is not unusual in very young horses for it to end in that complaint; in which cases, the inflammatory tendency of the catarrh calls the predisposition to strangles into action.

Symptoms.—The first appearance denoting this disease, usually observed, is a rigor or shivering fit; such fit may not always be remarked, but I believe it invariably occurs: other symptoms also are early accompaniments, as, a sore cough, moist and inflamed nose and eyes, all which arise from the general and early attack on

the mucous membranes of the nasal cavities and adjacent parts: but whether this primary attack on these mucous membranes precedes the rigor which only occurs when the specific part of the complaint (i. e. the fever) begins to operate; or whether the rigor may not appear prior to the attack on the membranes, and the affection be translated from the skin to those parts which may be under the influence of predisposition to the complaint, is not, I think, quite clear: but from what I have observed, I believe this disease may be generated in both these ways; and, as was remarked in simple fever, it probably owes its origin now and then to a fit of simple fever translated by *metastasis* to the catarrhal seat. But in whichever of these ways the complaint begins, an early inflammation takes place in all the cavities lined by the pituitary membrane, which seems the first local object of attack; and, as there appears in all the secreting or mucous membranes continuous or even contiguous to each other, a disposition to partake in the same inflammatory action, which is particularly exemplified by the constant tendency apparent in this complaint to extend backwards into the fauces; so, in many instances, it occasions sore throat; while, in others, it does not so much affect the pharynx apparently, but passes on to the rima glottis or entrance of the windpipe, producing a painful cough: should the inflammation be considerable, it may extend down the trachea, occasioning a more distressing sonorous and deeper cough, with a rattling noise in the throat from the increased secretion of mucus. Now and then the affection extends still further, and proceeds throughout the ramifications of the bronchia, when to the usual catarrhal symptoms are added peripneumonic appearances.

The symptoms therefore may be detailed as being composed of a dull heavy countenance, appetite lessened, eyes red and weeping, the nostrils also redder than usual, and moistened with a flow of thin watery fluid. There is almost always present a sonorous, deep-sounding and painful cough, which is frequently accompanied with sore throat. The pulse is always quickened, but is seldom either very full or hard, unless the inflammatory symptoms are urgent, and even then the urgency is more betokened by the acceleration than by the force, and this more particularly after the first and second day. It is also not uncommon for the submaxillary glands under the throat to become swelled, and, sometimes, the parotid or vives at the side of the throat are the same, and, now and then, other swellings also appear on the chest, the belly, or legs; but neither the one nor the other prove critical, that is, the disease never seems to centre in these swellings, and thereby to become evacuated; neither do these tumefactions seem to exasperate the fever, but, on the contrary, I have remarked, that when they have appeared early in the disease it proved rather a favourable symptom. On the second or third day the appetite wholly ceases, the cough seems still more painful, the pulse still quicker, and the breathing also becomes even more accelerated; but, unless there are peripneumonic symp-

toms, it is not often laborious in this complaint. About this time, likewise, a purulent discharge appears at the nose, and the horse is observed to become very weak, much more so and more suddenly than the intensity of the symptoms would lead one to expect. The legs, muzzle, and ears, alternate from hot to cold and from cold to heat, but there is very seldom that intense coldness in them that is present in inflammation of the lungs. In this state the disease may be expected to appear at three or four days from its commencement; when, if not very violent, and if it has been judiciously treated, the discharge from the nostrils may increase, but the heaving and quickness of breathing may be expected to decrease; the pulse also will moderate, the horse look more lively, and be disposed to eat a little of some favourite food. The dung, which has been before dry and in small quantities, and the urine, which has been also little and high coloured, return to their natural quantities and consistence, and the horse recovers gradually, but seldom rapidly.

But the complaint does not always take this favourable turn; on the contrary, by injudicious treatment, or by a translation of the inflammatory action, it may be changed into a true peripneumonia: sometimes also, in spite of every care, the discharge will become inordinate and very foul, the weakness will increase, the pulse become faltering, cold sweats appear, and the animal sinks on the fifth, sixth, or seventh day. In others, these fatal symptoms are not so rapid, but, eventually, the horse becomes tabid, and dies after ten, twelve, or fourteen days. It also not unfrequently occurs that, though he soon recovers, yet an obstinate cough will remain from coagulable lymph thrown out into the trachea: if this consists of one distinct mass on any part of the tube, the horse becomes a roarer. The disease sometimes also ends in broken wind: and, not unfrequently also, when the inflammation has extended to the lungs it terminates by effusion in the chest: in which latter case, the animal first seems deceptively amending, but a yellow serous fluid issues from his nostrils, the pulse becomes soft, but hurried and irregular, and, at last, suffocation ensues, sometimes early in the complaint; at others, it is protracted much later, as is more fully detailed in Pneumonia.

Causes.—These have been described as principally dependent on a variable state of the atmosphere, acting upon a peculiar liability or aptitude in the constitution to become affected; more particularly at the vernal and autumnal equinoxes. In some years, this liability is more general than in others, and the disease also in these years assumes a severer and epidemic type, and appears likewise disseminated by a specific contagion. In other seasons there is reason to question its contagious characters, and it seems simply promoted by the liability that the spring months particularly, produce in all horses, but principally in younger ones. It may also make its attack at any other time of the year upon an undue exposure to cold, and probably, also, upon a sudden change from cold to heat as well.

Stabled horses are more particularly obnoxious to it, but it will also attack those at grass, or in any other situation.

Prognosis.—This must be drawn from the violence of the symptoms, as the quickness of the pulse, as well as that of the breathing, the early and kindly discharge of a moderate quantity of healthy purulent matter from the nose. When the patient coughs strong and without much distress, eats moderately, and remains tolerably free from weakness, there is little danger: but if, on the contrary, the inward soreness is extreme, the weakness excessive, and the pulse much beyond a hundred, the danger is considerable.

Treatment of the Epidemic or Catarrhal Fever.—According to the degree of violence exhibited by the symptoms, so must the treatment correspond in activity; and before this is detailed, it is proper to remark, that it may happen when the cold fit preceding the attack is detected, if any stimulant is given sufficiently strong to overcome the irritation already produced, that the complaint will make no further progress: the means whereby this may be effected are detailed in the treatment of simple fever. But when the cold has once given place to the hot fit, the disease may be considered as formed; and then to give stimulants would greatly aggravate it. The treatment in such cases must be begun by bleeding to the amount of two, three, or four quarts, according to the age, size, and condition of the subject; but should a practitioner be called to a case of this kind, the third or fourth day from the attack, he ought well to examine the pulse before he proceeds to bleed: in such case it would be prudent also to try the strength of the horse, by walking him out a few paces; for if the pulse, though quick, should be small, and the patient staggers in his gait, and, particularly should he be a young one, then by no means draw blood. But, otherwise, when called early in the complaint, bleed to the amount mentioned; and, unless urged to it by a fear of topical affection of the chest, or that the febrile symptoms remain very strong, and the pulse does not become softer; unless any, or all, of these circumstances urge it, do not repeat the bleeding; but should the existence of any of these render it necessary, then repeat it to the amount of two-thirds of the original quantity. After this, back rake, and open the body by laxative clysters (see *Materia Medica*), bran mashes; and if these do not succeed, give some laxative by the mouth also (see *Laxatives, Mat. Med.*), but avoid actively purging the horse, and proceed in mild cases to give the following ball twice a-day:—

No. 1.—Emetic tartar (*tartarised antimony*) . . two drams,
Nitre (*nitrated potash*) . . . . . three drams,
Cream of tartar (*supertartrate of potash*) two drams,
Honey, sufficient to make a ball.

But when the cough is painful, or the throat is too sore to admit a ball, or when any of the symptoms are urgent, then much more

dependence is to be placed on the following drink, given two or three times a-day, as the symptoms prove more or less urgent :—

No. 2.—Emetic tartar *(tartarised antimony)* . . two drams,
Nitre *(nitrated potash)* . . . . . three drams,
Simple oxymel (see *Mat. Med.*) . . . four ounces.

Dissolve the nitre and emetic tartar in six ounces of boiling water, and then add the oxymel. Should there be any symptoms of pneumonia, add to each drink, *powdered foxglove one dram;* and, instead of water, dissolve the powders in thin linseed tea, and continue to horn down the same at other times, if the animal will not drink it. Should the throat appear very sore, rub into it some mild sweating or blistering ointment; and if the cough is very considerable, do the same to the brisket and sides also. In case the parotid glands likewise should be much inflamed, rub them with volatile liniment or mild sweating blister (see *Materia Medica*), or insert a rowel under the jaws; but this should not be done if the horse is less than four years old and there is any reason to suspect strangles, in which case poultice or foment instead. If the submaxillary glands under the throat are enlarged, rub them also with the volatile liniment, or mild sweating blister, as above. A warm mash should be constantly kept in the manger, or, what would be much better, to hang it to the head by means of a nose bag, the mash being put in hot, and renewed every four hours, which will greatly tend to bring the vessels to a suppurative process, and thus terminate the inflammation, and prevent the throwing out of coagulable lymph either in the trachea or bronchia; which should be, to the practitioner, a desideratum of the utmost consequence: for it may be considered a rule subject to few exceptions, that the catarrhal fever brought early to discharge by the nose, and such discharge kept up without check from cold, will rarely terminate in broken wind, thick wind, or chronic cough. This early discharge will be likewise promoted by clothing the head in a woollen hood; the body should also be tolerably warmly clothed, and the legs watched, and, when cold, hand-rubbed and wrapped round with flannel or haybands. In fact, I think genial warmth more necessary in this complaint, than in any other of the inflammatory affections to which the horse is liable.

During the further progress of the disease, the fever should be kept down by diluting liquors, as thin gruel, or linseed tea; by gently opening the body by mashes and clysters, and particularly by the remedies No. 1 or 2, the latter of which will be found the most active and best adapted to the complaint when at all serious. And in this as in every other fever of the horse, an open airy box, or at least a loose stall, is of great consequence. When the former is to be had, no other exercise is required than that which the sick animal will take himself: for in walking horses out who are labouring under active illness, it should be remembered that exercise increases the circulation, and quickens the breathing; and it does

both in a twofold degree at these times. Therefore, until a horse gives unequivocal symptoms of amendment, it had better be avoided, unless the legs swell enormously, and the confinement is absolute within a narrow stall; then five minutes walking exercise may be allowed in the temperate time of the day. In the months when green meat can be procured, it should by all means be given; and at all times, when the disease is advanced, the animal ought to be tempted to eat by hand-feeding, with particularly sweet meadow, or, what will sometimes entice more, with clover hay. Malt mashes will assist to keep up the strength; but if they are refused, gruel should be frequently horned down the throat; and if the weakness is extreme, give it also in clysters.

In spite, however, of every care, sometimes the disease will take an unfavourable turn; the discharge will become profuse, and the weakness extreme: in which case, instead of the former remedies, give the following three times a-day, and, if very urgent symptoms arise, once during the night also:—

No. 3.—Mindererus's spirit (see *Mat. Med.*) : . . four ounces,
Sweet spirit of nitre *(nitrous æther)* . . half an ounce,
Simple oxymel (see *Mat. Med.*) . . . . four ounces,
Powdered camomile . . . . . one ounce.

Notwithstanding all these precautions, should symptoms of increased malignancy present themselves, the disease may then be considered as the malignant epidemic, the treatment of which is detailed under that head, and will form the next subject of consideration. In the weaker stages of the mild complaint, and under the appearances that may occur when it is more untoward than might be expected, the treatment so fully laid down in the former article, that of simple fever, will equally hold good here, and may be implicitly followed.

It remains only to be noticed that this disease may also terminate in an unfavourable manner, without producing immediate death: but as these terminations are exactly similar to those which occur in inflammations of the lungs, they will be detailed under that head.

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Catarrh *or* Influenza *in* Neat Cattle.

Kine are liable, like horses, to an *influenza*, *distemper*, or *cold*; or, according to cowleeches, to the *fellon*, though fortunately not in an equal degree. In some years it rages with a mortal violence, and then it deserves the name of a malignant epidemic, and as such will be treated on under the next head.

In very stormy weather, at any time of the year, oxen and cows sometimes become affected with this complaint: the former are particularly liable to it, because, in those countries where they are worked, they are more artificially treated, and become, like horses, exposed to heats and colds. The disease makes its attack much in

the same manner as with horses: there appears a defluxion from the eyes and nose, which are also more red than usual; the hair stares, the flanks heave, and are tucked up, and on the second or third day the animal loses the cud. As soon as it is observed, remove the beast into a warm shed, bleed to the amount of three quarts, and give once or twice a-day the drink No. 2, page 339, or the powder No. 1, omitting two-thirds of the antimonial, or emetic tartar. In fact, no material difference need be made in the treatment from that of the horse, except that where a drain is thought necessary, instead of a rowel, a seton is in general inserted in the dew-lap.

MALIGNANT EPIDEMIC FEVER.

Typhus Gravior.] [*Maladie Epidémique.*

It has been doubted whether horses are subject to putrid fever; but whoever has observed a horse apparently first attacked with the mild or common epidemic, which then proceeded through all the stages of morbid debility to throw out the most fœtid sanies from the nose; the mouth, the stools, and all the secretions betraying the same fœtor; and, at last, the whole cellular membrane becoming affected with serous effusion, termed water farcy; cannot then doubt the existence of a putrid affection in this animal. Among neat cattle its ravages are too notorious, and its characters too well marked, to need argument; and it may be also considered as a full proof of the liability of the horse to the same, it having occurred, that during the ravages of the malignant epidemic among cattle, horses have also become affected; though it must be allowed that this has but seldom taken place, and, on the contrary, in some seasons there has been undoubted evidence that horses have fed and housed among infected kine with impunity. But that, not only does the horse generate and produce this epidemic with a true malignant character in his own person; but that he does also now and then receive it by the medium of affected cattle, there is also full proof. All the French veterinary authors describe this disease. Bourgelat treats largely on it; and La Fosse, among other symptoms of putridity, notices the existence of aphthæ or thrush throughout the mouth, throat, and alimentary canal. Other authors, likewise, mention an epidemic among horses, accompanied with a phlegmonous tumour, similar to the human anthrax, which did not proceed to suppuration, but fell immediately into gangrene. Lancisi, an Italian veterinary writer, describes a putrid epidemic that destroyed many horses in that country in 1712. Osmer also, a well-known English veterinarian, notices an epidemic among horses, that had evidently putrid appearances, and was undoubtedly of a malignant kind, from what he terms the critical abscesses, and which distemper, he says, had raged for more than fifty years at different periods. It appears to have been known also to the antients.

and we learn from antient history, that they were in the habits of sacrificing to their deities to avert the calamity. Franciscus Fantasti, and John Baptist Mazzini, who have written *De Peste Bouni*, inform us, that the horses of their country became, in like manner, infected with it; and from whence, we are told, they inferred that the contagion of one kind of animal could excite a similar diseased action in another of a different kind; and of which we have, in fact, other instances, as the grease of horses will inoculate the teats of the cow, who, in return, will taint the milker's hand. The rabid dog gives his mortal malady to all around him, &c. &c.

Symptoms.—The malignant epidemic of horses always commences by similar appearances to the mild epidemic: in fact, there is every reason to suppose that it is in many cases only a heightened degree of the common catarrhal affection, pushed into a putrid type by the violence of its action: but at some times, we have reason to believe, it has raged as a malignant disease altogether, *sui generis*, though, fortunately, it has been but seldom. In the malignant kind, in addition to the symptoms accompanying the mild sort, there is purging usually present, and a bloody stinking discharge from the nose; the breath is also fœtid, the pulse quick, small, and wavering, and the weakness extreme.

Treatment.—Whenever the common epidemic rages with peculiar violence, still more caution ought to be observed with regard to bleeding; but a laxative should never be omitted; and as soon as any appearances of malignity present themselves, the most active means must be employed to support the strength, and destroy the putrid tendency. The temperature around should be rendered cool, and fumigations of hot vinegar frequently used; perhaps even a vinegar bath might do good. Green meat should be given, malt mashes also, and nutritious clysters; and when the weakness is very great, or the appearances of putridity alarming, give port wine, or ale, and in case of diarrhœa throw up starch clysters. The following may be administered every four hours:—

Sweet spirit of nitre *(nitrous æther)* .	half an ounce,
Mindererus's spirit (see *Mat. Med.*) .	four ounces,
Infusion of camomile	six ounces,
Beer yeast	six ounces,
Tincture of opium	three drams.

Mix.

To this, in case of necessity, may be added two ounces of Peruvian, oak, or willow bark.

The Malignant Epidemic Fever *in* Neat Cattle.

The *distemper*, *murrain*, or *pest*, among cattle, has at various times proved a terrible scourge to the agricultural interest, and, indeed, to the world at large. We gather from history, that the *malignant epidemic* was not unknown to the antients; and the

ravages of it among their horses, as well as kine, were such as to induce them to make solemn fasts to appease the divine wrath and avert the calamity; and though it is probable, it has appeared more or less in every succeeding age, yet among the moderns but little was written on the subject before the beginning of the eighteenth century, during the first half of which it became very prevalent on the Continent; and, in 1757, it gave Britain also a very heavy visitation, before which it seems not to have been much known in this country. In 1710, 1711, 1712, and 1713, it raged among neat cattle throughout Hungary, Italy, and Spain. Lancisi, an Italian author of this time, whom we have before noticed, wrote a celebrated treatise on the complaint, *Dissertatio Historica de Bovilla Peste*, in which he informs us, that the disease made its appearance under a variety of circumstances, and with various symptoms; but the affected were all remarkable for their heavy dull air, with a hanging of the head, and a terror and anxiety apparent in all their manners: the eyes were moist, with a considerable effusion likewise from the nose and mouth; the fever was considerable, with great debility; the tongue and fauces were invariably ulcerated, and which, perhaps, accounted for their disposition to refuse all fluids in two or three days from the attack. On dissection of the morbid bodies, particularly of those who lived some days from the attack (for some died within a few hours), the different viscera of the chest and belly, particularly of the latter, were found sphacelated and gangrenous. Lancisi attributed its origin to a peculiar poison. Michellotti likewise treated of the epidemic of this period, but supposed it occasioned by the unfavourable weather having injured the grass, and rendered the ground damp: *De Morbis Boum.* Gazola describes the disease as accompanied with pustulous sores, from which issued an ichorous bloody discharge: *De Peste Boum.*

In the years 1730 and 1731, there was a second continental visitation of this dreadful malady, and several medical tracts appeared on the subject; the most considerable of which was written by Goelick. This author does not particularize any great varieties between the symptoms exhibited in this and the former disease: in a cow that he killed purposely to afford him an opportunity of immediately inspecting the morbid appearances, he informs us, he found none of the viscera affected but the gall-bladder, which was amazingly distended with bile, whose fœtor was almost insupportable. Goelick objects to the administration of the alexipharmics of those times, as being too heating; but he advises the use of setons, and cautions the attendants against letting the matter of the ulcers with which the animals were affected, touch their hands, giving several instances of malignant buboes formed by this means. In 1740, there was another continental attack, but which does not, from the accounts given, appear materially to have differed from the former. In 1744, 1745, and 1746, it again became prevalent throughout Holland, extending to Germany, and other parts of the Continent, making dreadful havock. Buchard, an Italian author, wrote ex-

pressly on it at this time, and called it an acute malignant continued fever, or a contagious and inflammatory affection, accompanied with dysentery. The whole account this author gives of it is excellent, and the plan of treatment, for the time he lived in, appears highly judicious: *Buchard de Lue Vaccarum Tubugensi.*

But the person who has left us the best description of this terrible disease, is M. Sauvages, the illustrious Professor of Medicine at Montpelier. He describes it as very fatal; making its appearance by a distaste to food, and, when the symptoms had become well marked, the affected animal had a dull heavy air, the head was held down, the sight was indistinct; he grew restless, laying down and rising again frequently, with an unusual trembling; the hair stared, the eyes watered, the extremities were cold, and the whole of the muzzle was excoriated from the acrimony of the purulent running; the respiration became constrained and difficult, and the pulse from forty-five to fifty in a minute; while in health, he says, it only amounted to thirty-eight pulsations, more or less *. Purging was a constant symptom in the complaint after the first two days; but, previous to this, there was frequently an appearance of costiveness, and a little hard black dung was produced; after which, came on a constant evacuation of a deep green fluid, that was intolerably fœtid, but which, it was remarkable, other cattle so far from avoiding, sought it, and seemed to have a delight in smelling to (*renifler*), and snuffing it up; and that dogs and swine would eat it: this matter on the fifth and sixth days assumed an oily appearance, with air bubbles on the top. The prognostic was favourable, or unfavourable, in proportion to the violence of the diarrhœa, which was so fatal a symptom, that it frequently carried off the animal the day it appeared. There was usually great tenderness about the withers and spine, and frequently also an emphysematous appearance. On dissection, there appeared marks of inflammation, but seldom of gangrene; the paunch was generally found full of hard, dry, undissolved matter; the other stomachs were livid and inflamed, as was the internal surface of the intestines; the gall-bladder was usually very much distended, with an acrid thick brown bile; and the lungs sometimes, likewise, exhibited marks of inflammation. Mons. Sauvages adds, that, on a calculation, nineteen in twenty of those attacked were killed by it. No specific was found for it, nor any means of prevention, but that of separating the healthy from the sick; even the dogs that went into the infected stables became diseased, and the persons attending upon the animals were so likewise. In conjunction with the other medical professors of Montpelier, this illustrious author recommends to bleed the animal the moment he is suspected of being sick, and to do the same as a preventive; and immediately after to give a purgative of aloes and senna: he also recommends to augment the insensible perspiration by means

* It is probable that some error has accidentally crept into this account by this celebrated author; as neither the increase during illness, nor the natural state of the pulse, can be correct.

of stimulants, after which setons are to be introduced into the dew-lap.

The other medicines employed, were the theriaca andromachi, or diascordium, with the testaceous powders to excite a flow of saliva, and a running at the nose: to give exit to the emphysematous air, he directs slight sections in the skin; and he advises also to acidulate the drink with vinegar. He adds, in another place, that bleeding and purging appeared hurtful in this disease; I suppose he means, that they were not to be proceeded with after the first day; but that mucilaginous fluids, ipecacuanha, and the lesser astringents, were the best means of cure. Perhaps it would be difficult to point out a superior mode of treatment to this. *Vide Mémoire sur la Maladie Epidémique des Bœufs de Vivarais.*

In 1756 and 1757 this disease raged in England likewise: there appeared several tracts on the subject at the time, most of which did not outlive the continuance of the epidemic; but among them, one by Dr. Layard, a physician of London, was so much esteemed, that it became translated into several other languages. He describes the complaint as first appearing by a difficulty of swallowing, an itching of the ears, an involuntary motion of the head, and a staggering gait; to these succeeded the greatest debility, and a constant desire for rest: there was much cough, and the exacerbations of fever were greatest at night, with constant diarrhœa; the perspiration had a disagreeable smell, and there were little tumours felt under the skin in passing the hand over the body: these symptoms augmented usually on the seventh or ninth day, at which time, if the body became covered with large pustules or tumours, which proceeded to suppuration; if the fœces became less liquid, and the urine thicker or less pale, the prognostic was favourable; but if, on the contrary, the diarrhœa continued beyond this period, if the breath continued hot and the body cold, and the discharge from the eyes and nose increased, the animal appearing in pain, then death was usually near.

Dr. Layard's mode of treatment appears judicious; he directs the animal to be placed in an open stable, the litter frequently removed: those who were robust he recommends blood to be taken from; those that were lean, on the contrary, not: the body then to be washed all over with an infusion of aromatic herbs in water (if it had been in vinegar, it might have been better); this was to be repeated every day: he likewise directs setons in the dew-lap, and, if there was much appearance of inflammation, and the animal was also costive, he advises a purgative of lenitive electuary and Glauber's salts. In addition, he advises an infusion of madder and horse-radish, fennel, feverfew, rue, and sage, to be given night and morning.

This great epidemic or murrain spread likewise through Switzerland, Germany, and Poland. This contagion is described, in the Philosophical Transactions, as propagating itself in the form of a blue mist falling on the grass where the cattle grazed, from which

they often returned home sick, and died within twenty-four hours: on examination, their tongues were found corroded, and their spleens sphacelated. It is there also mentioned, that the antidote for the sick and well was the same, viz. soot, gunpowder, brimstone, and salt, in equal parts; a spoonful of which mixture was a dose. During the years 1760, 1761, and 1762, different provinces on the Continent were again visited by it. The ingenious Plenck, on dissection, by the help of his microscope, found all the viscera affected with numberless small worms, which he conjectured were the cause of this complaint, and set himself to discover the best vermifuge as a remedy: but these might possibly be engendered subsequent to the complaint, or the industrious Leeuwenhoek would, perhaps, have discovered the same in a healthy animal. Bourgelat, who was consulted at this period, recommends ammoniacum and the fetid gums, dissolved in vinegar, to be used.

From these united testimonies two indications present themselves; the one is a curative, the other a preventive one.

The *Curative Treatment* of this complaint may be, in a great measure, gathered from these united accounts. It may be added, that the treatment may be condensed into such means as will principally tend to support strength and combat putridity. Bleeding, even in the early stages, ought to be sparingly employed; but an active purgative may be with great propriety administered. Fumigations should be made use of tending to destroy contagion, and those of the nitric acid would be most proper. See *Fumigation*, *Mat. Med.* The abscesses should be bathed or fomented with hot vinegar; but, above all, I would recommend an active and observant trial of the following, given three times a-day:—

Mindererus's spirit (see *Mat. Med.*)	four ounces,
Beer yeast	eight ounces.

Should there be much diarrhœa present, add to this powdered opium one drachm; and likewise throw up a starch clyster frequently.

The *Preventive Treatment* must consist in first separating the infected from the healthy, and strictly preventing their future intercourse. In the human plague it has been found, that the anointing the body universally with oil, has, in a most wonderful manner, prevented the persons so rubbed from being susceptible of receiving the infection. I should, from analogy, have the greatest hope of a similar result from this process, tried on such healthy cattle as were exposed to the contagion; and as the means are easy, and not expensive, they might with great propriety be tried. The unhealthy districts should be put under strict quarantine, and the healthy should destroy the germ of contagion if possible, by universal fires of green wood throughout the country. In these places particular care should be taken to house the cattle when the weather is intemperate, and all exposure to inclemency should be carefully avoided. It is not improbable also that a mild purgative every ten days might do much as a *prophylactic*. The houses in which the affected may

have been, and all their appointments, should be washed with lime, and the apartments fumigated with the antiseptic fumigations detailed in the *Materia Medica*. The bodies of the animals who die from the disease should be buried sufficiently deep to cover them from dogs, &c.; and their skins should be buried with them.

SYMPTOMATIC FEVER.

By this is to be understood those general inflammatory appearances that accompany great local affection; that is, when any one or more of the vital organs are much inflamed, or where there is any great internal affection, there is always present considerable derangement of the system at large, accompanied with much general increased action or inflammation; this is termed *symptomatic*, or *compounded fever*. It is evident, therefore, that fever, in this instance, is not to be regarded so much a disease as a prominent symptom; and as such it is to be considered in the practice, and any attention to it is but a secondary indication: nevertheless, as it sometimes runs so high, as greatly to aggravate the other symptoms, wearing away the strength of the animal, so as to render him unfit to struggle with the real disease, so it must still, under these circumstances, be a subject of attention. This is by much the most frequent fever of horses; for though other febrile affections certainly do appear, yet it is comparatively but seldom; whereas fever, combined with inflammation of some essential organ or organs, as of the brain, lungs, intestines, &c., happen every day. We must, however, except from this the catarrhal fever, which is sufficiently frequent.

It is not easy to say whether the febrile disposition is antecedent to the local inflammation, which then becomes a consequence of it, or whether it is produced from it; but, I believe, from what I have observed, that at times it is both. On the first attack of most fevers, there appears to be a particular contraction of the capillary vessels, which are probably increased in their action, perhaps by the application of a particular stimulus; by this means the blood is driven into the veins, and this state seems to form the cold shivering fit preceding fever, or constitutes a part of it: when this first effect is completely over, these vessels, before constringed, now become preternaturally enlarged, by the heart and larger arteries overcoming the resistance, and then there is first a return of heat, and at last sweat breaks out. Perhaps it may happen, when all the parts are acting in concert to overcome this contraction of the extreme vessels, some one part may be more weakened than another by the exertion, and its minute vessels rendered less able to contract on the distention that follows upon the hot fit, by which the weakened vessels remain permanently distended, constituting local inflammation of that part; the irritation and derangement of which keep up that fever as symptomatic, which before was primary: thus much must take place, to account for local inflammation arising from the attack of fever, and

proceeding from it, which, I believe, is very frequently the case. It likewise is not difficult to suppose one organ in an accidental or even natural state of weakness, and which, in such cases, will be the one most likely to suffer.

But it happens again, in other instances, that inflammation at once attacks an organ or part, in which its effects are seen before the febrile symptoms appear: in this case, the pain and inflammation of the part shall gradually increase unperceived till they become too severe to be hid, and we detect them then accompanied by the fever.

Though the general treatment of internal inflammations may resemble each other in many particulars, yet, as there is always a necessity of topical applications, so it becomes essentially necessary to distinguish the organs affected; and this forms one of the great branches of the art. It is to be remarked, that in some instances several organs shall be affected at once, and yet the fever remain symptomatic: these cases become very complex, inasmuch as the symptoms are difficult to define; nevertheless the treatment must be that of general inflammation.

When, therefore, to the general characteristic marks of fever, which we have in the foregoing pages described, there are superadded other symptoms, we have reason to suspect, that, instead of simple fever, it owes its origin, or its continuance, to a local affection of some one essential organ; the particular mode of judging of which, may be gained by attention to the details in Class II.

Class II.

Inflammation of Organs essential to Life.

BY this is meant those internal inflammations, that though local and confined, yet affect organs of such magnitude and importance, as to form themselves each into a peculiar and marked disease.

INFLAMMATION OF THE BRAIN.

Phrenitis.] [*Mal de Feu*, ou *Mal d'Espagne.*

THIS disease, which is by farriers called *mad staggers*, and *phrenzy fever*, is also by some veterinarians termed *apoplexy:* but which is a much more improper name for it than either of the former; for it has none of the characteristics of apoplexy, which is a mechanical rupture of some of the vessels of the brain; whereas this disease consists in an increased determination of blood to that organ, united with an inflamed state of its vessels. The *staggers*

appears to exist in two different forms; one produces symptoms of coma, and from hence is known by the term *sleepy staggers:* the other is accompanied with much delirium, and is, therefore, called the *mad staggers.* I was formerly disposed to consider these as separate complaints, or, at least, as varieties of one disease; but a more extended experience has disposed me to consider them as one and the same affection, differing only in the different degree of inflammatory action going on; and perhaps also on the different degrees of irritability in the organ attacked: and this mode of viewing it appears the more correct, when we observe how frequently the drowsiness and torpor, that accompany the complaint in the outset, give place to the delirious and furious state in the latter stages.

The comatose or sleepy state of the complaint renders it very liable to be confounded with another, but totally different disease, originating in a specific inflammation of the stomach, and which is at present known among veterinarians by the term *stomach staggers.* In this latter complaint, such a paralysis takes place of the stomach, that it becomes incapable of contracting on its contents; and the pressure occasioned throws a vast quantity of blood on the brain, which also produces comatose symptoms, as stupidity, drowsiness, and an inclination to press the head forward. These appearances, being so very similar with those of true staggers, would make it appear difficult at first to decide between the two; but the increased urgency of the symptoms, particularly in the delirious state, is alone sufficient to distinguish them; add to which, that in staggers the eyes and mouth remain of their natural colour, or at least are only increased in vascularity; whereas in stomach staggers they are almost invariably tinged with bile. There is also present in the stomach staggers a more generally diffused nervous affection, characterised by spasmodic twitchings, not common in the true phrenitis. While, therefore, every stage of this complaint (except now and then when the coma is extreme) betokens increased muscular energy, from heightened action of the brain; the stomach affection exhibits usually symptoms of mechanical pressure and diminished energy, with a sympathetic weakness dependent on, and always present with, inflamed stomach and bowels.

But a correct judgment can only be formed between these two diseases, by a careful attention to the symptoms of each as detailed in the *Outlines;* for in our description of stomach staggers, it will be seen that now and then a considerable degree of violence is present in this also, which might, without a conversance with the other peculiarities, mislead a casual observer. The phrenitis, brought on in the horse by the bite of a *rabid* or *mad dog*, as it is called, still more nearly resembles the mad staggers; but even here the observant practitioner can detect distinctions fully sufficient to ground an opinion upon. In the *rabid phrenitis* the symptoms evidently betoken an alienation of right mind, if I may so express myself, and which is characterised by a mischievous disposition. A horse thus affected, therefore, attacks, as in a rage, every thing that comes in his way;

rack, stall, and manger, are all laid prostrate. In the true staggers nothing of this kind appears; the horse is wild, and beats himself about, and endangers every thing around him, but not by premeditated design: on the contrary, he simply labours under a violent spasmodic contraction of his muscles, uncontrolled by the judgment of his mind; from whence he throws himself about, falls prostrate, or kicks, from mere muscular irritation.

The *Symptoms* of true phrenitis, or staggers, may be detailed thus: —There is usually, first, observed a disinclination for food, with a slight running of moisture from the eyes, which, if attentively observed, even in the very early stages, will be found rather redder than natural; the nostrils also are more vascular than usual: as the disease advances, the horse appears impatient, and throws himself about in a strange manner, as though frightened at something; or he falls into a drowsy state, holding his head low, and resting it in the manger, and which state sometimes continues till within a few hours of his death, when he becomes convulsed, and is carried off: but more generally, on the second day from the attack, he exhibits more watchfulness, his eyes sparkle, his nostrils extend, his head is raised, and he appears as though looking at the rack. Each succeeding hour aggravates the disease, if nothing is done to stop its violence; the animal, becoming more furious, bounds from side to side, and then falls in a state of insensibility on the ground, or dashes about the pavement in convulsive and insensible struggles; suddenly, however, he rises, and renews his violence. The pulse is not always the same in every case, being in some instances more frequent than natural, accompanied with a full throbbing feel; but it is, I think, more usually diminished in its quickness, yet in either case it has very generally a hardness and fulness: now and then, however, particularly in the comatose or sleepy state, the pulse is oppressed, and very slow. It is always accompanied with great marks of fever, and the secretions are sometimes increased, but more frequently they are diminished, and costiveness is present, as well as a very small urinary secretion; and which latter symptom commences with the disease, and continues till within a few hours of the death of the animal, when there is frequently a considerable flow of urine. The progress of the complaint is various: it now and then destroys on the second or third day; at other times the fatal termination is protracted to the fifth, sixth, or seventh; or it may admit of a natural cure, and the horse slowly amends. It is, fortunately, not a frequent disease, and, when early and judiciously attended to, it may in the greater number of instances be successfully treated. On examination after death, the pituitary membrane throughout has been sometimes found highly inflamed, and the membranes of the brain are always very much so: in some, water has been found in the ventricles; but in all, the plexus choroides is greatly enlarged, and unusually vascular.

The *Causes* of phrenitis, or mad staggers, may be various: one common origin is, I believe, the translation of idiopathic fever to this

part; great heat may also occasion it; excessive exertion likewise: and it may be produced by the common causes of other local affections, as the sudden transitions from heat to cold, and from cold to heat. A full state of the habit, suddenly acquired, is not an unfrequent cause of it, which may be brought on from an injudicious removal from a low to a full diet, without preparation or restraint; and however any of the other circumstances may operate as the immediate cause, the remote one commonly exists in a plethoric habit; for which reason it is seldom met with but in the young, robust, and full fed.

The *Prognosis* is favourable when the redness and flushing of the eyes decrease, when the horse becomes more tranquil, when the pulse softens, the dung and urine appear in sufficient quantity, and symptoms of appetite return: but when the secretions continue small, the impatience increases, the teeth are heard to grate, and particularly if a sanious discharge issues from the nostrils, the termination proves in general unfavourable.

The *Cure of Staggers.*—As all the varieties of this disease appear to arise from an increased determination of blood to the brain, joined to an inflammatory state of its vessels; so it is evident that the cure must principally depend upon lessening the quantity of the blood generally, and on diminishing the increased action of the vessels of the part particularly. Both these indications are equally promoted by bleeding; and whenever this is early and largely practised, the effects are commonly salutary. In such a case, therefore, proceed to draw blood immediately to the amount of six, seven, or eight quarts, according to the age, size, and condition of the horse; as well as referring to the degree of violence in the symptoms. But it will be often found very difficult to draw blood in this complaint, from the furious, impatient state of the animal: under these circumstances patience must be exercised, and the practitioner should not be deterred, but must wait the momentary cessations of the violence, when he may boldly open one or even both jugulars, and suffer the blood to flow until something like the above quantity may be supposed to have escaped. Should the violence of the horse prevent the application of a pin to the vein, no danger need be apprehended from suffering it to bleed as much as it will, particularly if one only is opened; on the contrary, when the quantity that flows is not sufficient, a further encouragement ought to be given by a ligature passed round the neck. It has been strongly recommended, from very respectable authority, to bleed from the temporal artery in preference to the jugular vein; I presume, under a supposition that, by so doing, the blood immediately passing to the head would be lessened: but this is one of the errors of acting from analogy, or arises from a circumscribed attention to the particular anatomy of the animal in question. It will be seen in pages 128 and 201, and in Plate 4, letter *b*, of the head, that I have been at particular pains to shew that the distribution of this artery is different from that of the temporal of the human, and that, in the

horse, it simply ramifies and terminates in the masseter muscle, and neither furnishes the eye, nor the internal parts of the head; consequently no particular good can be derived from opening it in preference to the jugulars, unless it should so happen that, from the horse laying extended, it might be more easily got at. Under these circumstances the practitioner would be justified in opening it, but not in the same manner as is described in bleeding from the human temporal, by dividing it across, for, if so done, the ends would probably retract under the skin by the muscular power in the artery: but it should be operated on by puncturing it in the same manner as is practised on a vein, and it may be secured if necessary afterwards by a pin, &c.; which will seldom be requisite, for the first bleeding can hardly be too considerable: on the contrary, if it is even pushed till the horse is faint, it will be so much the better, and then the vessels collapse as a matter of necessity. When it is wished to open this artery, therefore, its situation is particularly described as before stated, and may be always detected three or four inches below the root of the ear, in a line from its base towards the nostril.

Having finished the bleeding, if possible, insert under the jaw a rowel well smeared with blistering ointment, back rake, and throw up a purging clyster (see *Materia Medica*); and, if practicable, give an active mercurial purge by the mouth, either as a ball, or, if more convenient, dissolved as a drink (see *Purges, Materia Medica*). Should the symptoms continue violent in a few hours after all this has been done, bleed again largely, and blister the head, if it can be done without danger of the ointment getting into the eyes: but if from his violence there is reason to fear this, I have, in such cases, very successfully encased the upper part of the head in a pitch cap, and have introduced the blister in the centre of this. Mr. Coleman recommends to pour boiling water on the pasterns, but this plan has nothing but its cruelty and novelty to recommend it, and never can be equally beneficial with a blister applied more immediately in the neighbourhood of the affected organ. There is little necessity to caution the attendant with regard to the food, for it is very seldom but that there is a total loss of appetite; if, however, from a false sympathy, the horse should be inclined to eat, he should be debarred from it on every account: the motion of the jaws is unfavourable to the return of the blood from the head; a full stomach is equally unfavourable; not to add, that the weakness occasioned by fasting would be particularly salutary here. When the delirium and frantic symptoms are very great, it would be very advisable to sling the horse as is done on board ships, which will effectually secure him from injuring himself, and render him more conveniently got at by the operator. It can hardly be necessary to hint, that the stable should be kept as cool as possible; and when a blister cannot be applied, it might not be amiss to dash the head with cold water frequently. When the disease assumes a comatose appearance, and the horse has what a farrier would call

the *sleepy staggers*, the treatment must be exactly the same, and the blistering is as urgently called for in this as in the former. In cases of amendment, it is prudent to guard for some time against any exciting causes of plethora, as I have seen it return with increased violence more than once.

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OXEN and cows are subject now and then to have a species of fever, which country persons call *a fever of the brain*. In such cases, if the delirium is manifest, the treatment must be also similar.

SPECIFIC INFLAMMATION OF THE STOMACH, CALLED STOMACH STAGGERS.

THIS disease, from its resemblance to *staggers* in its symptoms, and from its cause being attributed to an over-distended *stomach*, has received the name of *stomach staggers*. To Mr. White, of Exeter, the veterinary world are particularly indebted for a much more detailed and clear account of this complaint than any that had yet appeared; and though I materially differ from him in my opinion of the nature of the malady, I fully acknowledge that I have added also much to my stock of information concerning it from his researches. Mr. White, in describing this malady, hints that it should be called the *symptomatic staggers*, in contradiction to the phrenitis, which he terms the idiopathic staggers; and, under his view of the matter, there would certainly be great propriety in so calling it: but some experience, and a very close attention to the subject, has fully convinced me that, on a more extended acquaintance with this peculiar disease, it will be found to merit the novel designation I have given it.

Several of our older writers describe the complaint with sufficient accuracy, but they all consider it as a primary affection of the head; and as their researches seldom extended to the examination of the morbid appearances of cases after death, so the cause remained involved in obscurity. Mr. Coleman, who had heard of the affection, but had very seldom seen it, first conjectured that it arose from a distended stomach, and hence called it stomach staggers; but he appears to have prosecuted his inquiries no further. With much more experience, and infinitely more ardour, Mr. White adopted the term, hinting only that it would be more proper to call it symptomatic staggers; but, in other respects, he has been content to consider it in the same point of view with Mr. Coleman. It however appears to me, that what has been regarded as its *cause*, is a *consequence* alone; and that the distention of the stomach is a mere symptom of the complaint, but whose real nature seems to consist of an inflammation of that organ *sui generis*; differing

from gastritis, or simple inflammation of the part, as well as from that likewise brought on by the action of poison; though a morbid effect produced from something without, has been also hinted at as its probable source.

In all the cases that have been examined after death, one appearance was common to all; *an inflamed state of the lower part of the stomach towards its pyloric orifice;* but a distended state of the stomach was not always present: it is therefore not unnatural to look on that as a cause which always exists, in preference to that, which, though common, yet is not invariably present. From the great frequency with which the distention of the stomach is met with in these cases, Mr. Coleman and Mr. White have been induced to consider mechanical distention as the immediate cause of the complaint; and the weight of such authorities entitles the matter to great attention. These gentlemen regard the symptoms produced, as resulting from the sympathetic connexion between the brain and stomach, united to the effects that would arise from this distention throwing a vast quantity of blood on the brain. This gorged state of this organ is considered as an accidental circumstance, dependent on any cause that induces the animal to take in an inordinate quantity of food, particularly of a dry nature; and, hence, that it may, in many instances, be clearly traced to follow a full meal given after long previous fasting, the distention of which produces a mechanical debility in the organ: as a farther proof of which, Mr. White observes, that it usually attacks old, weak, and hard-worked horses. But, in my own experience, old and weak horses are by no means the only subjects of attack; on the contrary, I have seen it in the young and robust, and, likewise, under circumstances where no exposure to irregularity in the manner or matter of feeding appeared to exist: and Mr. White himself candidly admits that it has occurred also under his observation as well at grass as in the stable; and in cases where there was no opportunity of paralyzing the stomach in the first instance by abstinence, nor any stimulus to over-distending it afterwards. In these instances, at least, we must therefore look for another cause.

But we need not be indebted to theory to induce a belief that this disease is not dependent on an accidental distention of stomach; we may at once advert to facts clear and decisive. There is before the public, through the medium of Mr. White, a very full account of this complaint as it existed in the neighbourhood of Swansea, in South Wales, where it appears to have raged in an endemial form, and assumed a truly epidemic and even contagious character: we are told by Mr. White's correspondent, that it was most prevalent between July and September, and was fatal in seventy-six cases out of eighty. No age or sex was exempted, and, whether in the stable or at grass, or working underground in mines, all were equally obnoxious to it. It has occurred more than once in the same neighbourhood, always in an epidemic form; and it also gave ample proof of its being highly contagious. Mr. White, though he ad-

mits these appearances were strongly characteristic of a contagion; and though he also allows that the country people familiar with it, all consider it catching, as it is termed; yet he himself very unwillingly allows it any character of this description: but, from the very clear and satisfactory statement of the disease, as it raged near Swansea, and from what I have myself seen of it, I have no hesitation in considering it, in some instances, as a contagious epidemic. In minutes of a correspondence, now before me, where my opinion was required, it occurred during the spring, and attacked three horses out of five; the other two were removed as soon as the nature of the disease was understood, and thereby escaped. Other notes made by me, of actual cases, and other correspondences relating to the subject, all tend to confirm the opinion I have already stated; nor does it at all go to weaken this argument, that it often selects a single horse from among a number, the rest of whom shall all escape it: the same happens every day with typhus fever in the human subject, which is too notoriously contagious to need comment; and it is not attempted to be denied that it is only under particular circumstances of malignity that it does assume an epidemic and contagious form.

From all these considerations I feel, therefore, no hesitation in considering this as a disease whose proximate cause is dependent on *a specific inflammation of the stomach*; distinct and differing from those inflammations of this organ brought on by the usual causes of such affection; as, translation of common fever, access of cold, or from the action of any common poisonous substance.

I was first disposed to regard this matter in the novel point of view it is now placed in, from observing the effects of an inflammation (evidently specific) of the stomach in other animals, but particularly from what occurs in the rabies, or, as is popularly termed, madness* of dogs: for, whoever will be at the pains to inform himself by an attentive observation of the symptoms while living, and of dissections of rabid canine subjects when dead; will find that this malady unquestionably consists in an inflammation specific and *sui generis*, principally affecting the stomach of the animal: and though the inflammation is not in rabid dogs, nor in other brutes, confined to this organ alone, but extends also, in some cases, to the bowels, and, in others, to the lungs; yet this very circumstance rather tends to strengthen the proofs I would draw from it: for when the lungs form the principal seat of the complaint, the symptoms are always more violent, or, rather, the manners of the animal are so: and it is from these cases, and these only, that this fatal malady has derived the popular name of *mad-*

* I believe I do not arrogate too much to myself when I assert that I have seen more of this singular complaint, *rabies*, and have also paid more attention to it, than any other person in existence. I have attentively watched the progress of it in many hundreds of cases, and have as attentively examined the morbid appearances of a vast number after death; I can therefore deliver the above opinions and remarks with some confidence, and without fear of contradiction.

ness * ; but when, on the contrary, the inflammatory attack is principally spent on the stomach and the bowels, it produces symptoms extremely similar to what occurs in stomach staggers; and it is worthy of remark, that the analogy holds good still further; for in almost every rabid dog who dies under that stupid drowsy kind, called *dumb madness*, there is present also an enormous distention of the stomach from substances taken in; and here, likewise, the inflammation is usually greatest at its large curvature and pyloric orifice. This distended state of the stomach, in the rabid dog, is so very common, that it may be almost regarded as an unerring characteristic of the complaint: and it appears, that the disposition thus to fill the stomach, is actually dependent on the peculiar inflammation of the part, and on that alone; for idiopathic gastritis is sometimes seen, and the inflammation produced by mineral poisons is sufficiently common; but in these no such disposition is observed; whereas, in the specific inflammation of the organ produced by rabies, there is a peculiar and almost invariable disposition to distend the stomach sometimes with food, but more commonly with other substances: and it appears to me, that this uncontrollable desire (the effect of some morbid sympathy) is simply to *fill* the stomach; the sensation of hunger having no part in it: and therefore, after death, in almost every one of these cases, an enormous mass of undigested anomalous matter is found within it, composed of every trash that comes in the way of the animal.

Exactly the same, I conceive, occurs in the horse, the specific inflammation of whose stomach stimulates him in like manner by a similar morbid sympathy to take in a large quantity of food, the paralytic state of which prevents its contracting on its contents; consequently, though this distention is not the original cause of the complaint, yet it will greatly aggravate the distress and urgency of the symptoms.

The *Symptoms* of this specific gastritis commence generally by a drowsiness; the horse eats slowly and at intervals, but he still recurs to it again; the breathing is slightly accelerated, but the pulse suffers no material alteration, except now and then when it is rather quickened, and in other instances again it appears rather oppressed; in the greater number, however, as has been observed, it is not materially altered until within a few hours of death, when it invariably becomes small and oppressed. There appears a particular diminution of all the secretions; the costiveness is peculiarly obstinate; and the urine is ejected by a convulsive effort, and in small quantities; but the quality is not generally altered. In every instance there are strong marks of biliary affection, and all the mucous membranes are tinged yellow by it; the probable cause of which

* It is worthy of remark, also, that the rabid malady in other brutes, as the horse, the ox, and sheep, always produces symptoms of great fury and excitement; and, in all these, the lungs are principally inflamed, while the stomach and bowels are, in general, subordinately affected.

is, that the liver, to a certain degree, partakes of the inflammatory affection. The nostrils, the eyes, the mouth, and the inner part of the anus, are therefore invariably yellow under this disease. There is generally, also, some appearance of slight rigor at the beginning of the complaint; but as it advances, the extremities become, one half hour, very cold; and, the next, the horse breaks out into a profuse sweat. The sympathetic effects on the brain very constantly and early shew themselves by the nervous or spasmodic twitchings present over the whole panniculus carnosus, particularly observed in the breast and hind quarters: the nervous affection is also accompanied by an early and characteristic muscular weakness; which is such as to make the unfortunate sufferer bend his legs and totter, as though falling; and he is likewise observed not to rest his head in the manger, as in the sleepy staggers, but he elevates it: and as though he wished to gain a fulcrum of support, he forces it often between the rack staves.

I never saw the disease in a horse at grass; but when it does occur there, it is said that it is peculiarly marked by the manner of the animal, and the state in which he is frequently found: if he is discovered moving, he is seen to stroll about unconsciously till he meets with some obstacle against which he fixes his head, where he remains tottering. Now and then, however, there is some degree of irritability and violence present, but much more generally he is in a stupid, drowsy, and almost insensible state; and, in either case, there is always present a marked distress of countenance and manner: the jaws usually have a considerable rigidity, but not amounting to a perfect locking. These detailed symptoms are the common attendants on the malady, and are usually, all of them, present in every case; but the spasmodic twitchings, the obstinate costiveness, and the marks of biliary affection, are constant and invariable.

Prognosis.—As, in all the cases I have seen, the disease has terminated fatally, so I can only give, from my own experience, the symptoms that betoken mortality; which are, an obstinate continuance of the costiveness, profuse sweats alternating with cold extremities, and the under jaw rigid and nearly immovable: but from the accounts derived from other sources, returning health, in the very few who have recovered, has been signified by the convulsive twitchings abating, the jaw loosening, but particularly by the fæces passing.

The Cure.—Here, likewise, I can offer little on my own experience, having never witnessed a successful issue. This general fatality is not dependent alone on the obstinacy of the malady, but may be attributed, in some measure also, to the time generally lost before application is made for help. Mr. White has however been more fortunate; and in the case or two that fell under his notice, where recovery did take place, he attributes it to an early overcoming of the costiveness: but, if my ideas of the nature of the complaint are correct, however much a free exit to the fæces is to be wished, our efforts should be particularly directed to overcome the inflam-

mation of the organ, which alone occasions the obstruction to the passage of the aliment. I perfectly agree with Mr. White, that bleeding promises but little change of benefit, seeing the disease arises from a *specific* affection. Nevertheless, in all cases, I would at least try it; and when the symptomatic phrenitis is considerable, I would do it largely. The chest, or belly, about the girthing place, should be actively blistered; and, as unloading the bowels must, under every circumstance, be desirable, immediately give the following:—

Epsom salts *(sulphate of magnesia)*	eight ounces,
Castor oil	ditto,
Watery tincture of aloes (see *Mat. Med.*) . .	ditto.

Dissolve the salts in the tincture of aloes, united with an additional teacup full of warm water, and then add the oil and give.

From a peculiar sanative effect that castor oil appears in other cases to produce on the stomach and bowels, I should be disposed to give this remedy a trial first, and then proceed to back rake and throw up a purging clyster (see *Clysters, Materia Medica*): but as the costiveness is usually very obstinate, and the symptoms very urgent, so I would not wait more than five or six hours, when I should recommend to repeat the same; or, if judged more expedient, a strong purging ball (see *Purges, Materia Medica*) may be dissolved by rubbing it down with a yolk of an egg and a little warm gruel or ale. But I should be disposed to advise the drink in preference, more frequently repeated.

Those who reason from analogy only, will deprecate even the exhibition of the drink on an inflamed stomach; but one fact is worth all the theory in the world, and it does appear, from experience, that no medicine given by the mouth aggravates the uneasiness; which may be accounted for on a consideration of its specific nature; and certain it is likewise, that no remedies are calculated to do more good, than such as tend to draw the inflammation from the stomach by acting on the bowels; and, considering the paralysed state of the organ, a liquid remedy is much more likely to pass than a solid one, which does not seem to have been considered by Mr. White in his directions for the treatment: for the same reasons, also, active clysters should be continued.

It only remains to throw out a hint to the experimental veterinarian, which is; that in any future instances of this complaint that might occur to him, but more particularly where it should appear to exist in an endemial or contagious form, I would recommend him to try the effects of arsenic internally administered, and I would do it on the following grounds. This poison, there is reason to believe, does not exert its baneful influence wholly by its caustic qualities, but it excites a specific inflammation on the stomach; one principal proof of which is, that it will act equally through the medium of the blood vessels. If this is the case, from analogy we are warranted in concluding that no better remedy could be devised

than one wherein we were enabled to pit one specific inflammation against another: under which treatment, from what we see in cases something similar, we might hope for a beneficial result. As the disease is a desperate one, and no efficient means are at present known to combat it, this may be worth the trial.

INFLAMMATION OF THE LUNGS.

Pneumonia.] [*Péripneumonie.*

The lungs in the horse form a very large mass, which, united with their extreme vascularity, renders them very susceptible of inflammation; and as this affection proves very frequently fatal to him, so the subject is a very important one to the veterinarian. This disease was formerly but little understood among farriers, which added much to its fatality; and if no greater improvements had been made in the art, than have taken place in the knowledge of the causes, effects, and mode of treatment of this disease alone; still the founders of these improvements would have been eminently useful, and deserved well of the community. Farriers, from observing the gangrenous state of the lungs in these cases after death, have supposed that the horse died from some long-continued malady, which gradually decayed these parts, from whence they called it the *rot:* and their treatment of the complaint has been what such a supposition would lead to, as hot stimulating drugs to stop this *rotting* process; but as we now know that the disease arises simply from an inflammation in the parts, we are aware, that this heating plan is the most destructive that can be pursued, and must end in death in the majority of cases in which it is practised. Other farriers again, observing the difficulty of breathing present in it, have supposed that the lungs rose towards the throat, and have hence named it *rising of the lights:* these persons have set themselves to give heavy medicines to keep down the lungs; and, at the same time, combined the heating drugs, so that the effect has been the same.

Writers on human medicine have usually described under pneumonia two different diseases, one of which, termed *peripneumony*, was considered as an inflammation of the *substance* of the lungs, characterised by a quick, but soft, or by an oppressed pulse; the other, called *pleurisy*, being an inflammatory affection of the *membranes* only of these organs, and distinguished by a hard and more full pulse. The older writers on farriery also, however good, trusted too much to analogy, and derived but little from experience, or from observations made on morbid anatomy; hence they also describe at length, after the human, two distinct affections. But a more intimate acquaintance with the subject has clearly proved that no such distinctions exist in the horse; in whom the sub-

stance of the lungs is always inflamed in common with the membranes. The French authors of celebrity, as La Fosse, Bourgelat, and Vitet, likewise describe a distinct affection of the pulmonary membranes, under the term *pleurésie:* but it was the peculiar fort of the French writers of this time to split differences, and to make numerous varieties, which their more modern writers have, in a great measure, corrected.

Symptoms.—The approach of pneumonia is sometimes very insidious, commencing with a dry hard cough that is scarcely noticed; and which will now and then exist two or three days before the horse appears otherwise ill: at length, however, he looks less lively, and is observed to breathe quicker. In other instances the attack at once shews itself, not by a cough, but by a shivering fit; or sometimes he is first observed to be dull, hot in his skin, and to heave at his flanks: gradually the eyes become red, and the nostrils more particularly so, which, as the disease advances, change to a purple hue. The ears and legs, in the beginning of the disease, will be found of a variable temperature, sometimes warm, and at others cold; but as the complaint proceeds, or even if very violent at the outset, the extremities will be intensely cold, and will remain invariably so. The pulse, on examination, will not always present the same appearances; it will sometimes be very considerably increased in quickness, to 90, 100, or even more, in a minute: at other times again it will be but little quicker than natural, but a particular *indistinctiveness* and *oppression* are always present, and this forms a very distinguishing feature in all violent inflammations of vital organs, but in this one still more particularly. The reason for which appears to be, that the right side of the heart becomes weak from distention, while the left has not sufficient blood to contract on; for the enlargement of the lungs, from the inflammation, is such as to prevent the free flow of the blood through them; and from the same cause the air also is prevented from being so readily respired, which occasions the quick laborious breathing: other febrile affections may quicken the breathing materially, but here it is evidently laborious, and difficult also. From a similar cause arises the characteristic mark of the complaint so common, which is, that an affected horse seldom lays down, it may indeed be said never, but continually stands, day and night, often with his fore feet apart; which arises from the necessity he feels for employing the assistant muscles of respiration more fully to distend the chest with air; and which auxiliary muscles are some of them common to the chest and fore extremities, and consequently act best on the former, when the latter are fixed.

The appetite is generally lost, and there is a remarkable appearance of distress in the countenance, without usually much expression of active pain: there is always likewise a stiffness and disinclination to move, the head is held low, and the nostrils distended with the difficulty of breathing. The eyes are commonly moist, sometimes they are red and starting, while the whole veins of the head and neck betoken suffusion, and an obstruction to the passage of the blood.

A frequent, hard, and dry cough is sometimes present, and forms a strong feature in the complaint; at others little is heard of it. At this period, if an active and judicious treatment is not adopted, the disease proceeds rapidly, the pulse becomes still more oppressed and irregular, the neck and breast are observed to be affected with convulsive twitchings, the ears and legs feel still more intensely cold, although the body may have partial cold sweats breaking out over it; the nostrils change to a still more deep livid hue, and the air that comes from them is cool or cold; the mouth looks of a deadly white, the teeth grate, and the animal dies on the third, fourth, or fifth day, suffocated from a congestion in the capillaries of the lungs. On dissection, these cases exhibit a complete destruction of the pulmonary cellular structure, by the violence of the distention, by the suffusion of serum within them, and by the coagulable lymph thrown out; the right side of the heart is also inflamed from over-distention, and has been found burst. Sometimes, instead of simple congestion, the inflammatory action may proceed to gangrene, but which produces no particular difference in the time or manner of the termination; after death, however, the lungs will be found more livid than in the former case, and so tender as to hardly bear examining: this state may be known previous to death, by a fœtid smell, with some discharge from the mouth and nose. At other times a fatal termination of the complaint is occasioned by a serous effusion into the cavity of the chest, which usually begins about the third, fourth, or fifth day; the exhalent vessels of the lungs continuing to pour out the fluid till they completely fill up the cavity of the thorax, which consequently suffocates the animal by preventing the expansion of the air cells. This termination, which is equally quick and fatal with the others, may be detected before death by a serous discharge from the nose, but without much fœtor; and after death it shews itself by the quantity of bloody fluid extravasated between the lungs and ribs.

These form the early fatal terminations to the disease; but there is likewise another no less unfortunate winding up of the account, but which is considerably protracted, often to the second, third, or even fourth week from the attack, and is one also that frequently occasions the junior practitioner much mortification, and sometimes leads him greatly astray. It arises, equally with the last termination, from serous effusion into the cavity of the chest, but it is a gradual one, and accompanied with a remission of all the inflammatory symptoms, leaving only this disposition in the exhalents slowly to pour out the interstitial fluid in great quantity; combined also, as it usually is, with a tendency in the vessels, at the same time, to form a deposit of coagulable lymph, or which perhaps may have been an effect of a more early stage of the disease. In these unfortunate and deceptive cases, the horse looks more lively, the heat returns to the extremities, he begins to eat, and the pulse decreases in its frequency and increases in strength, and it is only a very experienced observer that can detect any difference in it from that of a horse under a real

amendment*: sometimes this variation from a healthy state is so very trifling, that it almost certainly escapes detection, particularly if the practitioner is still further thrown off his guard by the flattering picture drawn of the animal's situation by those around him. But in general cases the experienced veterinarian will detect, with a moderate degree of attention, a peculiar beat of the pulse, notwithstanding the improved state of it before alluded to; there will be a slight degree of *hurried irregularity* better felt than described. The peculiar sensation this pulse gives to the practitioner may be still more distinctly felt by placing the hand against the left side, when the heart itself will afford a criterion to the touch, that it is beating through a watery medium, as though vibrating within a bladder of water. This feel, contrasted with that of a healthy horse examined in the same way, will best teach the peculiarity. The existence of the water may be also generally suspected from the state of the coat, which usually stares and feels unkindly; and there is likewise, in most of these cases, a yellow serous discharge from the nostrils, at first thin, but afterwards thicker and glutinous; and it may be observed, that the animal appears alarmed on any sudden exertion, as turning quickly in his stall; he will be particularly so on holding his head up to receive a drink, which arises from a fear of strangulation†. In this state, something between sick and well, a horse will

* My worthy and ingenious partner, Mr. W. Youatt, was, during the summer months of 1814, called upon to attend a pneumonic affection, in the horse of Mr. H. E——, an eminent surgeon, then residing in the neighbourhood of Hanover Square. I happened to be absent from town, and only saw the horse once on my return, apparently in a state of progressive and even rapid amendment, and yet not such a one as quite satisfied either myself or my colleague: however, here the discriminating symptoms were so very obscure, that neither of us were prepared for the result. After the lapse of many equally flattering days, the horse was suddenly attacked with the symptoms usual in these cases; and as neither my partner nor myself were on the spot at the moment, another practitioner was called in, who bled the horse largely, which of course greatly aggravated his symptoms, and induced his owner, on the other hand, to ply him most actively with opium, bark, and other tonics. This was scarcely less injudicious, and the case proved, as might be expected, quickly fatal.

I particularize this instance to warn the junior practitioner to be always on his guard, and likewise as a hint, that he must, in his profession, be always prepared for untoward events; for were he even a prophet, he should not escape mortification. Here was a case attended with judgment, and one that promised the happiest results; but from that fatal tendency in it to terminate in this manner, it proved one that no art could parry; and the consequence was, that though the animal belonged to a gentleman whose education ought to have enlarged his mind generally, and whose profession particularly should have made him aware of the deceptive appearances under which some diseases mask themselves; yet in this instance, I believe, Mr. E—— was far from satisfied with what had been done, and, on the contrary, expected that Mr. Y——'s judgment ought to have been so beforehand with the disease, as to have foretold the mode of its termination from the first moment he saw it.

† A very curious fact is stated with regard to horses in this state, that, if they are taken into water out of their standing depth; as soon as they lose their footing, and are forced to attempt to swim, they turn on their backs and suffocate: this has happened from the circumstance of bathing them, under a supposition that it would benefit their convalescent state; and it has occurred more frequently under sea bathing.

continue to deceive the persons around him that are unused to these cases, for a longer or shorter period, perhaps for ten days, or sometimes two or three weeks even: suddenly, however, he is taken with a shivering fit, and all his former symptoms recur; and though they return with diminished violence, yet they will carry him off in a few hours. It may be, therefore, prudent to recapitulate to the practitioner, that the distinguishing marks of these kind of cases are to be drawn from the peculiar state of the pulse above described;—the breathing continuing rather quicker than natural;—an unhealthy feel, and staring of the coat;—a disinclination to lie down;—and an evident dread of any hurrying movement, or to a considerable elevation of the head. After death, it is surprising to see what mischief has taken place in the chest in such instances: the lungs are usually full of adhesions, and large masses of coagulable lymph will be found adhering to them, and others swimming in the serous fluid with which the chest will be filled.

Now and then, but much less frequently, peripneumony will produce suppuration in the lungs; in which case also, as soon as the suppurative process commences, some appearance of a remissio nof symptoms takes place, but not so perfect a one as in the former instance: matter will flow from the nose, the pulse will become hurried and irregular, and at length the animal will become choked without previous warning, or he may linger and die tabid from hectic irritation.

There are terminations likewise to this complaint not fatal, but still unhealthy and unfavourable. In one of these, arising from coagulable lymph being thrown into the air cells, respiration becomes considerably impeded, and the animal is ever after forced to make up, by more frequent inspirations, what ought to be effected by fewer; which forms what is called *thick wind*. At other times, an increased irritation of the lungs themselves, or of the mucous membranes of the bronchia and trachea, is left, and subjects the horse to a lasting *chronic cough*: if the affection is considerable, it lays the foundation for *broken wind*, which, as an accidental cause is applied, sooner or later takes place. In other cases, the air cells rupture directly after the illness, and broken wind immediately succeeds to convalescence *.

* A clergyman requested my opinion relative to a favourite horse, who had become broken winded, in consequence of inflammation of the lungs. The history of the case was, that the horse was violently attacked with this complaint, and a neighbouring farrier, of considerable repute, was sent for, who decided at once on the disease, as what it really was; but he alledged, that the *pulse was so low* he was afraid to *bleed* the animal, and, unless he gave *cordials*, that he would die. The event was, that under this treatment, though the horse did not die, his natural strength being great, yet his recovery was very slow, and *broken wind* remained. Here, it was evident, a valuable horse was rendered nearly useless, from a want of knowledge of the peculiar oppressed state of the arterial system in this disease: had the farrier, on finding this low oppressed pulse, bled the animal freely, it would have risen on the flowing of the blood; and had he repeated this two or three times, it would have returned to its natural state, and the horse would have recovered, sound in his wind: but the active stimulus of the cordials had occasioned a rupture of the air cells of the lungs.

Sometimes also the lungs themselves are left free from complaint, but coagulable lymph is thrown out across the trachea or windpipe, which narrows its capacity at some particular parts, and the air, rushing through these strictures, produces a sonorous noise called *roaring;* and the quicker the respiration, the greater of course will be the noise made: indeed, it is seldom but under increased action, as trotting or galloping, that it is heard at all: these coagulable masses become organized, and, as such, are never afterwards removed; a roarer, therefore, always remains such during his life.

On the subject of symptoms, it remains only to guard the practitioner against mistaking the *true* inflammation of the lungs for the *catarrhal* one, with which it may be confounded; though the experienced veterinarian will readily distinguish between the two. In the catarrhal epidemic, the extremities do not continue invariably cold, but are now cool and now warm; the distress of countenance is not so great; sore throat is commonly present; the breathing is less laborious, and the pulse seldom oppressed. The cough in catarrh is generally deep, and very painful; a weakness, not corresponding with the violence of the symptoms, is very early seen in the complaint; and though the lining of the nostrils may be inflamed in catarrh, it is seldom so much so as to present a purple hue as in pneumonia. The principal necessity that exists for making a careful distinction between the two complaints, arises from it not being found prudent in the catarrhal affection to push the bleeding, and other parts of the lowering system, so far as in the peripneumonic; and also from the greater necessity of keeping cool in the latter, to what exists in the former.

Inflammation of the lungs has also, by the inexperienced, been mistaken for colic; because the horse sometimes expresses some uneasiness, and often looks round to his sides; in which mistaken cases the treatment generally pursued has been such as to increase the disease; but in colic, the horse expresses much pain, kicks at his belly, lays down and rolls, and then suddenly rises: while, on the contrary, in peripneumony he never lays down, but stands stupidly quiet, except now and then, when he may look at his flanks; yet not with the impatient indications of pain that colic forces him to: it may be added, also, that the nasal membrane in colic remains unaltered in colour.

Causes.—The alternation of heat with cold is probably the most usual cause of this complaint. It was formerly considered that it could only be produced by a removal from a warm to a colder temperature; but it is now known that the sudden access of a warmer medium is a parent also of the complaint, though certainly not in an equal degree. Mr. Coleman, I believe, even goes so far as to say, that the exposure to simple cold never produces the disease; and that, though turning horses to grass without preparation may emaciate them, it never produces peripneumony: but this appears to be carrying theory far beyond fact, and such doctrine cannot be too carefully guarded against. Human subjects, horses, cows, sheep,

and dogs, are all more liable to coughs, colds, and pneumonic affections, in cold climates than in warm ones. The persons who slaughter horses in London, are accustomed to expect a glut of dead animals in hard frosts, from the fatal effects of inflamed lungs. It is true that the candidates for the former doctrine may say, that this still arises from the effects of exposure to *stable heat*, supervening upon the frost: but this cannot be the case in cows, sheep, farmers' horses, and those of others who do not treat them so artificially. Nor do we want numerous other facts to prove that a sudden access of cold is more certainly prejudicial than that of heat: few persons in the habits of hunting, but have met with, or heard of, cases of horses, who, from plunging into a river, have very soon after been attacked with the complaint; and in such cases it has been observed, that a permanent rigor has commenced immediately, and the animal could never be got universally warm again. Hunting on a cold scent, with frequent checks, or travelling with a cold wind blowing against the chest; washing the legs and body with cold water while the horse is hot; a sudden removal from a warm stable to a cold one, may any of them occasion the disease: and, as has been remarked, there is reason also to believe, that the removal from a cold stable to a warmer one, or from grass to a warm housing, without preparation, will also produce it. In fact, so open are horses to affections of the chest from a change of temperature, whether the change be from a warmer to a colder medium, or otherwise from a colder to a warmer; that it is very seldom a horse is brought from a dealer's stables, who does not, in a day or two, exhibit some cough. When a horse is removed from a cold temperature into a hot one, it is evident that the hot medium is immediately applied to the seat of inflammation; and as hot air must greatly tend to accelerate the circulation, so it is not difficult to account why it can produce the disease, and this more certainly if the heated air is less pure than that which the animal was removed from: when, on the contrary, the removal takes place from a warm to a colder situation, a similar effect perhaps also takes place; the cold air is immediately applied to the lungs, which may, particularly if the change is very great, by this means be suddenly weakened. These organs are liable not only to the ill effects of sudden changes of the air, as being at once applied to their internal surfaces, but also they are peculiarly liable to become affected from their intimate connexion with the skin, which is likewise at all times exposed to the vicissitudes of temperature: for both skin and lungs appear emunctories of the fœcal parts of the blood, and hence the sympathy between them is observed to be very great; and any thing that may prevent the exit of this fœcal matter, called *perspiration*, from the vessels of the skin, will throw much more of it on the lungs.

When, therefore, in addition to these occasional causes, we consider that the lungs are very large as well as very important organs; and that in an animal of speed they are peculiarly extensive in their surfaces, and extremely vascular in their structure; we shall be at no

loss to account for their tendency to inflammation. This tendency also seems much heightened, in common with the proneness to other diseases, by a life of art; for in a state of nature, or one nearly approaching to it, they are seldom attacked. The cows even experience this increased tendency, arising from artificial habits, as is observed in those kept near London and other great cities, where they are more artificially supported, and subjected to occasional housing.

The *Prognosis* in peripneumony must be formed from the strength of the symptoms, the progress of the disease, and the accidental circumstances under which the animal may labour. The veterinary practitioner should never lose sight of the greater rapidity with which all acute inflammations in the horse run to their termination beyond what they do in man, or in animals with weaker powers; which disposition is dependent, as we have taught, upon the great force of the circulation in this animal, and the increased strength of the muscular coat of his arteries. In this disease this rapid progress is particularly exemplified, which renders the caution here doubly requisite, when forming a prognosis relative to it.

A *resolution* of the inflammation is the most favourable mode of its termination, and this may be expected when the pulse approaches a natural state; when the horse shews an inclination to lay down; when the distressed look disappears; the pulse rises on bleeding; when the blisters rise, and the rowels inflame: and particularly the appearances are favourable when the breathing becomes less laborious, the breath itself of a natural temperature, and when the legs and ears resume their usual warmth. But if, on the contrary, the pulse does not rise on bleeding, if the breathing continues very laborious, a rattling in the throat comes on, the pulse being oppressed, or hurried and irregular, with partial cold sweats, and with an extreme dejection of manner; a fatal termination may be expected, either by direct gangrene from the extreme distention of the pulmonary capillaries, or from serous effusion into the cellular texture of the lungs. It is always a most unfavourable sign when the patient is insensible to external stimulants; that is, when the blisters and rowels remain without operating. The vital stores of the body are drawn from the lungs; and when they become diseased, all other parts lose their powers, and consequently their irritability and capability to be acted upon by external agents is diminished. I hardly ever remember to have seen a horse recover where neither the blisters nor rowels would act; such cases always betoken an intensity in the inflammatory action, and shew that the balance of power between the parts is destroyed.

The *Cure of Peripneumony.*—The principal indications of *cure* are two; first, to lessen the increased vascularity or distention of the lungs by bleeding; and next, to endeavour, by external stimulants, to change the diseased action; that is, by raising an external inflammation, we may hope to lessen the internal one: and it must be remarked, that as this disease is obstinate and quickly fatal, so the

treatment must be active, and pushed with energy; and we must use the means in our power with the more energy, because they are fewer in the horse than in man, and other quadrupeds, in whom we can lessen the action of the heart and arteries by nauseating remedies; and in some of whom we can also moderate inflammation greatly by exciting perspiration; but in the horse we are deprived of these powerful aids *.

* At the Veterinary College a contrary doctrine is taught, and from whence proceeds a practice that, in my opinion, is fraught with danger, and replete with absurdity. Mr. Coleman, I believe, considers a nauseating effect possible in the horse: and as such an effect is found materially to lessen the arterial action in man, so Mr. C. endeavours to produce the same in the horse by small doses of aloes, and which, I believe, is the only internal remedy administered at the College in pneumonia. The horse is also bled and rowelled; after which, to crown this efficient practice, he is at once, with all his infirmities on his head, turned out night and day into the open air, even in frosty weather. On this latter part of the practice the Professor argues, that, as we cannot act readily on the skin of the horse to produce perspiration, so all necessity for keeping him warm is done away. The cogent part of the argument, however, is, that as *cold* is found to lessen inflammation, so, by turning out, the cold air becomes applied at once to the inflamed part. Mr. C. condemns blisters because they irritate, and irritation adds to inflammation he remarks.

I would suffer this erroneous reasoning and this dangerous practice to speak for themselves, were it not that the College agents consider this treatment *as the very feather in the cap* of the school. To examine the matter attentively, we must dismember the parts; and we will begin with the aloes. Though a horse appears certainly dull under the effects of purgatives, we are by no means warranted to conclude that this arises from nausea; for one-third only of the stomach in this animal presents a secreting surface, and physiology shews us that but little of his digestive process goes on in this cavity. Nausea is a preparatory state of the stomach previous to vomiting; but as the horse was not intended to vomit, it is much to be doubted whether he feels this preparatory nausea, except on very particular occasions. The effect produced by purgatives are confined to the bowels, and do not exert a sympathetic effect on the stomach as in the human; indeed, there is reason to suppose the stomach in the horse is but little an organ of general sympathy, compared with the human: but the bowels in this subject are much more sympathetic organs, and form the true digesting stomach; and it is on them that the purging order of medicaments exert their properties: and though, as has been before observed, under their action a dulness and listlessness are observed, it is self evident it cannot be of a regurgitating kind; on the contrary, the distaste to food, and other appearances of affection, are more probably dependent on the slight degree of inflammation which is always produced in the intestines by purgatives; and which is a necessary part of the action of all cathartics, and is also more particularly felt in the horse than other animals, from reasons so fully detailed when treating on the physiology of his bowels (see *Intestines, Anatomy of the Abdomen*). It may be added, that as we know that the internal inflammations in the horse are not only prone to run from one part to another; but more particularly that one important bowel seldom becomes inflamed without the surrounding ones becoming partakers of it also, so the great error of expecting benefit from such a practice will still more clearly appear. But the matter may be brought yet nearer proof. Does the pulse of the horse, under what seems to be erroneously called the *nauseating* effect of aloes, decrease in strength and frequency? If my experiments are correct, and if my observations have not been erroneously conducted, the action of all cathartics tends to increase the arterial system, both in strength and quickness; that is, under that state of the bowels that precedes active purging, which is the state the College practice suggests, and endeavours to keep up. Another proof offers itself, that it would be most difficult to controvert. It is sufficiently notorious that active purging is almost always fatal in this complaint; and

The cure should therefore be begun by bleeding, according to the age, size, and strength of the animal, and also regard being paid to the time it has existed: for, when the curative treatment is commenced too late in the complaint, the bleeding cannot be carried to the extent that it may be in the early stage. As a general rule, it should be remembered that bleeding, in this disease, is never to be continued longer than it raises the pulse; that is, supposing it to be previously in an oppressed state, which it almost always is. More good is also gained by one bleeding within the first twenty-four hours of the complaint, than from numerous repetitions of it afterwards. From a moderate sized horse, five or six quarts, or even more, may be drawn; and should the symptoms indicate a necessity for it, particularly if the pulse rose on the first bleeding, in five or six hours take three or four quarts more; and, as long as the breathing continues laborious, the extremities perma-

Mr. Coleman himself, aware of this, advises that the aloes should be given only to *nauseate*, but carefully to avoid *purging*. Allowing even the nauseating effect of the remedy, how is it possible that, by giving two drams every two or three hours, as is the College practice, we can secure the animal against the dangers of purging, which almost always comes on suddenly as soon as the bowels are once roused into action? and, likewise, how is it possible to guard against this sudden attack, when we know that one quarter of the quantity will operate on some horses that it takes to move another? And, if I am rightly informed, this very effect has often followed this practice, and horses, so treated, have not unfrequently died from the ill effects resulting from the purging alone.

We will next glance at the *cool*, or rather *cold*, part of the treatment; the debilitating effect of which is sufficiently known; and though it is true that the *cold* is immediately applied to the lungs, yet it is equally true that active sedatives, except at the very outset of the disease, always hasten the gangrenous termination. But even though such might not take place with regard to the lungs themselves, yet the effect that *cold* has on the skin is too well known to need comment; and the peculiar quality of corrugating the skin and driving the blood from the capillaries into the larger vessels, and from thence to the heart and lungs, is universally admitted, and is capable of a thousand proofs. We know, also, that all our exertions are requisite to produce a general circulation, and to get the blood to flow towards the surface and the extremities; for which reason we warm and stimulate the skin by hand rubbing, and the extremities by clothing; all which is done to draw the blood to them, and thus to lessen the quantity accumulated within the thoracic viscera. The propriety of this practice is so notorious, that the College pupils were formerly directed to pour boiling water on the pasterns: and yet, to undo all this, the horse is subjected to the most active of all the repellents we know for driving the blood to the internal parts. Equally fallacious with the rest is the theory whereby rowels are recommended in preference to blisters; which, it is true, may *cost* more, and, if the veterinarian works by the piece, this may certainly be a consideration to him: otherwise he may, perhaps, find out that they do not increase irritation, but greatly lessen inflammation; and that rowels are, in desperate cases, much too slow and too confined in their action.

In fact I cannot, in terms too strong, warn the young practitioner not to be misled by the theory laid down to recommend this erroneous and novel practice. It is, unfortunately, the present habit at this seminary to affect a simple plan of treatment, and to decry the use of active, I believe I ought to have said of *costly*, remedies; and hence, a bleeding, a rowel, a frosty night, and a few drams of aloes, are said to be all that is requisite to cure a disease, that the *disinterested* practitioner will find to require active care, valuable medicaments, and, altogether, the most efficient means.

nently cold, and the pulse oppressed, but rising on the flowing of the blood; so long the bleedings should be repeated to the amount of two or three quarts at a time, at intervals of six or eight hours. This is recommended under a supposition that the treatment commences soon after the attack: but, if otherwise, and violent symptoms have existed thirty-six or forty-eight hours, the bleeding must be repeated with more caution, and the pulse most attentively watched; or the opposite extreme may be fallen into, and such debility succeed as may produce the very event we wish to avoid. The blood should be drawn from a large orifice, as directed under *General Inflammation*, and suffered to cool gradually without disturbance, by which the buffy surface will have an opportunity of shewing itself, and afford an additional indication of the propriety of persisting to bleed, or prove a check to its continuance. Immediately after the first bleeding, some active stimulants should be applied to the surface of the chest. Blisters have the effect of taking off the hair, which disfigures the horse for a long time afterwards; and, therefore, when the danger is not immediate, if any forcible objection is made to their use, the *sweating blister* may be rubbed well into the chest, or the *mustard poultice* may be applied; either of which will considerably stimulate the integuments, without removing the hair (*see these articles in the Materia Medica*). And, in more desperate cases, where other means of blistering were not present, a mustard poultice spread over the fleshy side of a sheep skin newly stripped off, and applied closely to the chest, would make an excellent substitute; or, in default of these means, as might happen under some circumstances, oil of turpentine rubbed well in, or even boiling water applied to the chest by means of flannel, might be usefully substituted.

But whenever the symptoms are at all urgent, proceed at once to blister the chest, first shaving the hair from the brisket or breast in front, and between the fore legs, and also the sides behind the elbows; and then rub in a blistering ointment wholly made of cantharides. If a strong prejudice exists in favour of rowels, and the symptoms are not very urgent, one may be inserted between the fore legs, and another ten or twelve inches further behind; but each should be quickened in its action by smearing with turpentine or blistering ointment: or, what would be better, the sides may be blistered, and the brisket rowelled. Nevertheless, in all urgent cases, it should be remembered, that the blistering is the quickest mode of subduing the inflammation. The state of the bowels should be next attended to, and a loose but not a purging state encouraged; to this end, back rake and throw up a laxative clyster; and in default of the operation of these in moderately loosening the bowels, give a laxative composed of any of the neutral salts (see *Laxatives, Materia Medica*): but I must be pardoned for again repeating that active purging must by all means be avoided. During this stage of the complaint, more particularly, no heating medicines on any account should be allowed, nor should the oppressed state of the pulse be suffered to

lead into the error of supposing any cordial remedy necessary, neither is any thing admissible under the notion of a sweating medicine: for, though a determination to the skin would be much to be wished; yet, in the horse, we are not able to produce such an effect but by means that greatly increase action, and hence do infinitely more harm than good. But as it is of the utmost consequence that we encourage an equal circulation and a warmth over the surface and extremities, so we should hand rub the skin to produce these effects, and then clothe warmly; and as it is, if possible, of still more consequence that we bring the circulation back to the extremities, which it is in general very difficult to do; so the legs should be very actively rubbed till something like warmth appears on them, and then they should be bandaged up either in hay-bands, or, what is preferable, in flannel. But the most certain way of restoring the circulation to the extremities, is to blister them; and in those cases where blistering might be otherwise advisable, as, in windgalls or weakened sinews, it would be more particularly eligible; for, by these means, much blood would be drawn from the chest, and the action of the vesicatory would keep it in the extremities. The muzzle, ears, and whole of the head in fact, may be considered as an extremity, and, as such, should be likewise attended to; the ears may be hand rubbed, and the head clothed in a neck hood; and if no blistering is made use of to the legs, litter well up to the belly with clean straw.

But it must at the same time be kept in mind, that the more care we take to promote warmth in the surface, and in the extremities, by clothing, &c., so we must be the more careful to lessen any source of internal heat; the temperature therefore of the surrounding air should be kept cool: if a thermometer is present, fifty degrees will be a proper medium. That cool air is refreshing and genial in these cases, we know by a horse in a box always standing with his head towards the door if open, and which, unless the weather is very cold, it ought to be, as a free circulation of pure air is of material consequence. When all the former directions have been complied with, proceed to give one or other of the following:—

No. 1.—Tartar emetic (*tartarised antimony*) . . two drams,
Powdered foxglove (*digitalis*) . . . . one dram,
Nitre (*nitrated potash*) . . . . . three drams,
Cream of tartar (*tartrate of potash*) . . ditto.

Mix with honey to make a ball, and give every four, six, or eight hours, according to the urgency of the symptoms.

In case the cough is considerable, or the chest sore, the following should be preferred, and it is the formulæ I generally use on these occasions:—

No. 2.—Tartar emetic . . . . . two drams,
Powdered foxglove . . . . . one dram,
Powdered nitre . . . . . three drams,
Simple oxymel (see *Mat. Med.*) . . . four ounces,
Liquor No. 3 . . . . . eight ounces;

Or, in lieu of this liquor, add linseed tea, gruel, &c., and give every four, six, or eight hours.

I may here remark, that when the young *college* practitioner has had but one-tenth of the experience I have had of the extreme efficacy of the foregoing formulæ, particularly of the latter, in all inflammatory affections of the chest; he will then judge for himself whether there are not other medicaments efficient in horse practice besides the few that he has heard recommended. The efficacy of each of the aforesaid articles singly, in this complaint, is considerable; but the increased virtues of the whole, when conjoined, are truly remarkable, and cannot be too strenuously recommended. It may be further remarked, that as peripneumony so frequently terminates by serous effusion into the chest, so it must be evident, that the prevention of this is most judiciously promoted by carrying off as much as possible the serous or watery parts of the blood, for which purpose such remedies as stimulate the kidnies are the most proper; and in this point of view, also, the foregoing formulæ will stand conspicuous.

With regard to food, no anxiety need be entertained for the first twenty-four hours, during which time the less the animal eats the better; but, if green meat can be procured, as being cooling and opening, it should by all means be given; and in the absence of this, bran mashes may be allowed, with only a small quantity of hay: but no corn should on any account be offered, nor should his mashes be given hot, or hung round the head, as in the *catarrhal fever*, or *distemper*. On the contrary, every thing that heats the air carried to the lungs increases their action, and the disease can only be properly treated by a strict observance of whatever tends to diminish the inflammatory diathesis. In this point of view, though we must carefully abstain from producing purging, we should also as studiously avoid costiveness, which is best done by back raking, or by aperient clysters; and, in case of failure in these, six or eight ounces of Epsom salts may be given. The body and extremities should be frequently examined, and whenever found to be getting cold, the means before detailed should be resorted to, to promote a return of the circulation. During the continuance of the complaint, linseed tea, slightly warmed, may be given to drink frequently; and if this is refused, give chilled water, and, occasionally, horn down the tea; or, if preferred, the following *liquor*, particularly if there is cough and much chest soreness:—

No. 3.—Linseed, and liquorice root, of each . . four ounces,
Mallows . . . . . two handfuls.

Boil in six quarts of water half an hour.

By steadily pursuing this mode of treatment for the first thirty-six or forty-eight hours, it may be expected that the distention and inflamed state of the pulmonary vessels will subside into resolution, which will be indicated by the appearances detailed in the prognosis. The strength must now be supported to assist this process, and

prevent a disposition to gangrene; but this must not be done by heating cordials, but by thick gruel, or malt mashes, and if the debility becomes extreme, by the following, substituted in lieu of the foregoing medicines:—

No. 4.—Powder of ipecacuanha . . . . . two drams,
Tincture of opium . . . . . half an ounce,
Camphor . . . . . two drams,
Mindererus's spirit (see *Mat. Med.*) . . four ounces.

Rub the camphor with the tincture and powder, and then add the Mindererus's spirit, and give with half a pint of gruel, or liquor No. 3.

But this is recommended only in such cases where the severity of the inflammatory symptoms has relaxed, and when from the existing debility there is reason to fear a gangrenous termination, as will now and then occur from the effect of this very debility.

When, on the contrary, after the period before alluded to, the inflammatory symptoms do not relax, push the medicines prescribed, particularly No. 2, still more actively, as, every three hours; rub in more blistering ointment to the neighbouring parts; or should that which has been rubbed not have operated, scald the chest with boiling water, applied by means of cloths wrung out between two other cloths, which will prevent scalding the hands of the operator. Continue active in this and every other part of the treatment detailed, until a favourable termination has been obtained; and, when it has taken place, it must be yet remembered, that there is no complaint hardly in which there is more danger of recurrence; every prudent precaution should therefore be used, as regular temperature, mild diet, gentle exercise, and an early exposure to cold ought to be guarded against. The whole list of what are termed *expectorants*, particularly in the early stages, should be carefully avoided, as they are always *stimulants;* nor is their benefit much more manifest at any period of the complaint: the digitalis, tartarised antimony, and oxymel, are the best and only expectorants admissible throughout the affection. Sudorifics, or *sweating remedies*, should be also shunned, more particularly in the beginning of the disease.

Inflamed Lungs *in* Neat Cattle.

Horned cattle are also subject to peripneumony, but not by any means in an equal degree with horses. Cowleeches and graziers call it *rising of the lights*, and it has also provincial names unnecessary to be noticed here. Various causes may occasion it, but it is, in general cases, produced by exposure to inclement weather, as driving rains with easterly wind, or snowy nights: oxen become affected with it sometimes from over driving, and I have seen the disease attack calves. In its appearances it is very similar to the same complaint in horses: the animal heaves violently at the flank, the mouth

opens to render respiration easier, the nostrils are very red, and the linings of the eyes also, and a moisture distils from them; the pulse is also very quick, but small. The head is hung down dejected, but the beast in general refuses to lay down, though not so invariably as is observed in horses; and the ears, legs, horns, and muzzle, are always intensely cold.

The *proper Treatment* of the complaint does not essentially differ from that recommended for horses, and should be begun by bleeding to the amount of four or five quarts; a large ox may lose six quarts: and here we may very properly avail ourselves of the power that nauseating remedies have over the action of the heart and arteries. If the beast is valuable, and the cost not objected to, give half the drink No. 2, detailed in the peripneumony of horses; but, if otherwise, half of No. 1, either as a ball or mixed for a drink, may be given; or the following will nauseate, and has been used with success:—

Emetic tartar (*tartarised antimony*) . .	half a dram to a dram,
Powdered foxglove	one scruple to two,
Nitre powdered (*nitrated potash*) . . .	two drams,
Infusion of tobacco	eight ounces.

Mix and give two or three times a-day, according to the violence of the symptoms. The infusion of tobacco is made by boiling two drams of the herb in a quart of water, for a quarter of an hour.

The bowels of the beast should be opened, but not purged; and the sides either covered with a mustard poultice (see *Materia Medica*), or they may be blistered, and a large seton placed in the dewlap: the legs should also be wrapped up in haybands, and a rug thrown over the body, but the temperature of the air kept particularly cool. The heating remedies of cowleeches should be most carefully avoided, and even the recipe of a more correct practitioner, containing two drams of camphor, must be considered as infinitely too stimulating. In six hours after all these are done, if amendment is not very evident, repeat the bleeding, and increase the doses of the remedies until evident nausea is produced; but, if distressing efforts to retch appear, lessen the quantities; beginning always with the smaller dose, and afterwards increase it if there is occasion.

Inflamed Lungs *in* Sheep.

None of the writers on horned cattle describe *peripneumony* as a disease affecting sheep; but I have seen it well marked, and in them, also, its origin could be clearly traced to exposure to inclement weather. Among my notes of practice, I find that the disease was rather prevalent among the few sheep that were kept near London in February 1808. Among other cases that fell under my notice, I was sent for by Mr. Adams, of Mount Nod, near Streat-

ham, to see the affected ones in his flock. From the shepherd's account I gained, that all the sick were attacked nearly together, immediately succeeding a very stormy cold night; five of whom were dead when I arrived, and five others remained very ill with it, and it may be noticed that the whole of them were ewes with young, and within a month of yeaning. The first symptom observed was the refusal of food, after which one and all had a peculiar stedfast fixed look; from this they would reel about, elevate the head in the air, become convulsed, and fall backward in a strong fit; and when the fit ceased, the teeth would grind so as to be heard to a great distance. The flanks heaved violently, the nose and eyelids were red, and from the nostrils distilled a watery moisture in some, and matter in others.

I opened the five dead ones, and, in all, the lungs were highly inflamed; in some, the whole of the lobes, in others only one side, was affected; but wherever the inflammation reached, that part was condensed almost into a solid mass by the congestion: some of the air cells also contained pus. In two, the liver was also slightly inflamed; and it is remarkable, that each of them contained two fœtusses. The five that were living I immediately bled and blistered; and, as soon as it could be procured, a drink was given to each, composed of nitre and tartar emetic, which appeared to arrest the disease, as the whole recovered; and all, except one, went their full time. This one, who, though prematurely delivered, yet must have had less time to go than the rest, yeaned while I was standing by; and, in despite of her illness, which was excessive, she made feeble efforts to nourish and cherish her young one, and appeared rather amended by the event: both mother and young lived.

In the peripneumony of sheep the treatment in nowise differs from that of neat cattle: bleed from the amount of half a pint to a pint, shear the sides and blister, and give one-third of either of the recipes directed for kine; house the sick, but not too warmly; and if the cud is lost, drench with gruel.

INFLAMMATION OF THE HEART.

Carditis.]

This is a very rare disease in horses; I never saw but one case in my own practice, and a veterinary surgeon of my acquaintance, who visits many sick, likewise never met with but one. In these cases there was less difficulty of breathing, but still more distress of manner than in inflammation of the lungs, to which the symptoms were very similar. The pulse was small and irregular, and there appeared frequent cold sweats over the body: the extremities re-

mained invariably cold, and both cases proved fatal. The treatment differs in nowise from that of peripneumony.

INFLAMMATION OF THE STOMACH.

Gastritis.]

This disease is very rare also, though the stomach is certainly sometimes primarily attacked with inflammation, in which cases it is very difficult to detect it, from its similarity to inflamed bowels. It is evident that it is not meant here to include those inflammations that are produced by acrid substances taken in: the symptoms in such cases are more definite, and which will be treated of in another place: neither is included the specific affection called *stomach staggers.* When the complaint occurs, the uneasiness is extreme; there is a loathing of all food, and if any thing is given it creates increased pain for a long time afterwards. The animal breaks out into cold sweats, lies down and quickly rises again, as in inflammation of the bowels; and the loss of strength is most remarkable: the pulse is also very quick and much oppressed. If the disease can be clearly detected, treat in every respect as directed under Enteritis, except that none of the internal remedies there directed should be used, but the following may be tried instead:—

Dissolve half a dram of sugar of lead (*superacetate of lead*) in eight ounces of water, to which add four ounces of very pure castor oil, and give every three hours.

In a well marked case, pouring iced water into the stomach might not be an improper experiment.

INFLAMMATION OF THE INTESTINES.

Enteritis.] [*Tranchées Rouge.*

The *Red Colic* of the farriers is an inflammatory state of the bowels, so called in distinction from the flatulent kind, termed, by the same persons, *gripes*, *gullion*, and *fret;* and which will be treated of in another place. Next to inflammation of the lungs, enteritis, or inflamed bowels, is the most frequent and fatal of the local affections of the horse, and of which there appears two distinct kinds; the one affecting their villous coat or surface, and producing purging; the other attacking the peritoneal coat, and accompanied usually with obstinate costiveness. It is this latter that forms the subject of our present consideration; the former will be treated of

afterwards. From an imperfect acquaintance with the art, it has been common for farriers to mistake this for spasmodic colic, and the error has commonly proved fatal to the affected horse; for the *comfortable things* and *heating drenches* given on such occasions always increased the inflammation, and frequently produced gangrene. A careful distinction should therefore be made between the two, which may be readily done by attending to the characteristic marks of each as detailed in spasmodic colic.

The *Symptoms*.—The complaint is sometimes preceded by fever, and always accompanied with it. It commences with restlessness, loss of appetite, the mouth hot and dry, and the inner membranes of the eyelids and the linings of the nostrils rather redder than natural. As the inflammation advances, the pain increases so as to force the horse to lay down and get up again frequently; but, as the pain is less acute, he very seldom rolls on his back as in gripes. Sometimes, however, he kicks at his belly or stamps with his feet, and in all cases he scrapes his litter or stall with his hoofs, and looks wistfully round towards his sides. The pulse is frequent and small, but with a distinct corded hardening in the stroke, whereas in spasmodic colic it is always much fuller: the animal also heaves much from the accelerated breathing; the belly is painful to the touch and very hot, and the pain is constant. The extremities are cold, but the skin of the body often heated, and the tongue white: the bowels are also confined, and if any dung is evacuated, it is in small quantities and very hard and dry. The urine likewise is made sparingly and of a high colour; and a strong character of the complaint is a very early and excessive debility.

The *Causes* are various, but they are generally dependent on the application of cold, as washing when hot, or plunging into a river; the drinking of cold water has likewise produced it, though more frequently this occasions spasmodic gripes. A long retention of the fæces may bring it on, as likewise hernia or intus-susception, which is occasioned by one part of a gut getting fixed within another: it may also be produced by the translation of the inflammatory diathesis of general fever, or by the communication of the inflammation from other parts, as I have often witnessed. Another and not unfrequent cause arises from flatulent colic, either neglected or improperly treated, which I have many times seen degenerate into enteritis under such circumstances.

The *Prognosis*.—If the costiveness is early removed, if the pulse becomes softer, more full, and less frequent; if the pain remits, and the heat of the body and extremities appear equal, it will terminate favourably. But if the costiveness remains obstinate, or, otherwise, a voiding of black fœtid matter appears; if the pulse becomes more quick and wavers also, and if the extremities continue invariably cold, the danger is great. And when added to these there is a peculiar earthy cadaverous smell from the mouth, with cold sweats, deli-

rium, and extreme debility; the termination will be almost to a certainty unfavourable; and as soon as the pain ceases in such a case, the gangrene may be known to have commenced.

The *Treatment.*—Like most of the other inflammations of important organs, this requires a very energetic and early application of the means used for relief, and still more particularly so in this complaint, as an instance of recovery seldom occurs where the treatment has been delayed beyond the second day: indeed, it often destroys in twenty-four hours. Bleeding is the first indication, and if the subject is young, large, and plethoric, six quarts may be safely taken away; and should the symptoms continue unabated, the same may be repeated in four hours, to the amount of three or four quarts more; nor should even a third bleeding be omitted at the same distance of time, if the inflammatory appearances have not become mitigated. The bleeding may be known to have a salutary effect by the pulse becoming softer and fuller, and at the same time lessening in hardness. As soon as the first bleeding is over, proceed to back rake, to remove any hardened dung that may obstruct the passage, and which would infallibly aggravate the complaint, and, indeed, in some instances is the cause of it: the distressing strangury that sometimes accompanies the red colic, is also in a great measure produced by the pressure of hardened excrement, as well as by a participation in the affection.

It is not the dropping away of a few balls of hardened dung, nor the passage of some thin glairy matter, that shews no obstruction exists: on the contrary, when these are present, a most obstinate costiveness might yet remain farther up in the passage; and a flow of thin fæces may escape by a groove formed by the side of an obstructing portion of dung, as has happened. Unless, therefore, there is an evident free passage to all the fæcal matter, and that it is wholly softened, it is always proper to rake; and as costiveness is commonly present in the complaint, and as it is seldom that amendment begins until that is overcome; so every means must be pursued to produce this: and as the state of the bowels is such as not, to appear prudent, to admit of strong purgatives being given by the mouth; so the greater activity is required to empty them mechanically, and by the assistance of clysters, which should be thrown up very frequently. Till the relaxation is complete, the injections should be mildly laxative ones, such as are recommended in the *Mat. Med.*; afterwards warm water only, or thin gruel will be sufficient. The quantities composing the clysters should be considerable also, so as to penetrate beyond the rectum, and to enter, if possible, the colon and cæcum.

The next indication is to raise a brisk external inflammation over the belly, to lessen thereby the internal affection; and in this case even the cantharides are hardly quick enough in their action: but a more speedy determination to the skin may be made, by first fomenting the belly with hot water for a quarter of an hour, and then applying a large mustard poultice farther liquefied with oil of turpen-

tine (see *Mat. Med.*), which may be spread on coarse linen or a horse cloth; or, what is preferable, the fleshy side of a newly-stripped sheep skin may be covered with it, and then applied close to the belly by means of flannel rollers, which will retain it in its situation: and should the complaint continue in full force after this, then proceed to blister in the usual way. If a situation were to occur, where nothing besides of a blistering nature was at hand, the belly might be actually scalded with boiling water, or a hot shovel might be drawn over it; or any other means may be made use of to stimulate the surface that are in the reach of the persons employed on the occasion. It next becomes a consideration as to what remedies may be properly given by the mouth, which must greatly depend on the degree of costiveness present. In a case where there was a moderately free passage to the dung, I would simply recommend castor oil or salad oil, eight ounces, made into an emulsion by beating with the yolk of two eggs, and adding half a pint of gruel. But when costiveness is present, as is usually the case, it is seldom overcome without some difficulty, and the symptoms will not abate until the bowels are freed of their obstruction; the practitioner must not, therefore, in such case, be too nice about the means to be employed; for those who teach, that nothing more active than castor oil should be given in red colic, reason only from analogy, and are not guided by experience. It will be found, that none even of the more active purgatives add much to the urgency of the symptoms, and I have in obstinate cases given six drams of aloes with evident benefit. The reason of this appears to be, that it is not the internal or villous coat that is affected, particularly in the early stages, consequently no more than the ordinary effect follows the administration of aperients. In general, however, where considerable costiveness is present, I would recommend that the following may be given in the first instance:—

Epsom salts (*sulphate of magnesia*) .	eight ounces,
Castor oil	eight ounces.

Dissolve the salts in six ounces of boiling water, or more if requisite, and by means of the yolk of two eggs beat into a smooth emulsion the oil and saline solution. In the absence of castor oil, use olive or even spermaceti oil; and in case the obstinacy of the costiveness should require it, or a second drink is necessary, add also four ounces of *watery solution of aloes* (see *Mat. Med.*), and repeat, if occasion requires, in four or five hours *.

Under these means there is reason to expect that the costiveness will be overcome, and the inflammation lessened; but should the effects not be equal to what is desired, a second bleeding, and even a third, must be resorted to if necessary; the aperients and the clysters repeated; and it must be attempted to hasten the stimulating effects

* In obstinate constipation in the human subject, the dashing of cold water without cessation for a considerable time has overcome it: but it must be left to the prudence of the practitioner to determine whether it may be advisable here.

of the external applications. Rowels are very commonly used by farriers, but they are much too slow in their action; however, when they are made use of, they at least should be smeared with blistering ointment. Before the costiveness is overcome, we should be careful of increasing the distention of the bowels by much liquids; but when there is a free passage to the fæces, considerable quantities of warm water, thin gruel, or linseed tea, may be poured down. The horse should be clothed warm, to promote a determination to the skin, the legs bandaged up, and plenty of litter allowed; at the same time that the external temperature should be cool: and in this, as in every case of illness, the patient ought by all means to have the use of a loose box.

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Inflammation *of the* Intestines *from* Superpurgation.

As the former affection consists of an attack on the peritoneal covering or coat of the intestines; this latter is usually the consequence of the administration of improper purging medicines, either as to quantity or quality; by which such a state of irritation is brought on as ends in inflammation of the surface, to which the substances were applied. It is commonly accompanied with purging, whereas the former has almost always costiveness with it: neither is the pain so acute in the latter, consequently the horse seldom expresses so much uneasiness by rolling or stamping; the pulse is also quick and small, but seldom hard. If the symptoms of inflammation run high, that is, if there is violent pain, if the extremities are cold, and the pulse appears able to bear it, three quarts of blood may be drawn; but unless these appearances exist in force, it will be more prudent to omit it. Stimulants should, however, be applied to the bowels, as in red colic; the clothing also should be warm, and means taken to keep up the circulation in the extremities by hand rubbing and bandaging: the stable also, in this disease, should be kept warm. The following drink may be given every four or six hours:—

Prepared chalk	two ounces,
Powdered gum arabic	half an ounce,
Powdered catechu	two drams.

Mix, in half pint of thin starch, arrow root, rice liquor, or tripe liquor; and, in case the purging is considerable, not only give this by the mouth, but also mix the same with two or three quarts of rice or tripe liquor, or thin starch, and give as a clyster, which will be found peculiarly useful and efficacious. If the diarrhœa should be excessive from the first, or should prove obstinate afterwards, add to the drench, powdered opium and powdered alum, half a dram of each.

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Inflamed Bowels *in* Neat Cattle.

Both the kinds of this disease, already described as common to horses, are also not unfrequent among kine. The *red colic* may attack them from over-driving, and then suffering them to drink their fill of cold water; from being out during a tempestuous night, or from other applications of cold; in which cases they present exactly similar appearances to those which occur in the same complaint in horses, except that it is here more difficult, I think, to distinguish between the red and the flatulent colic, which arises from our lesser conversance with the manners of these animals than we are with those of horses. The treatment in nowise differs from that we have already laid down: bleeding, opening the bowels internally, and stimulating them externally, are here also the principal means of cure.

The *inflamed purging* state, is likewise not unfrequent among cattle, but in them it does not draw its origin so much from the effects of purging medicines, as it does from a diseased state of the natural purge of the body, the bile; and to which form of the disease, from the greater complexity of their biliary structure, they are found peculiarly liable. Here the treatment pursued must depend on the cause, which will sometimes, as in horses, arise from flammation of the internal surface of the intestines; in which the curative plan must also be the same as detailed for the removal of the complaint in horses: but when it is dependent on a mixed inflammation, in which the liver bears a part, as is not unfrequently the case in cattle, then the treatment must be such as is detailed under that head.

INFLAMMATION OF THE LIVER.

Hepatitis.]

The liver of the horse is but seldom *primarily* affected with inflammation; though, when other great abdominal inflammations take place, then this often participates; and now and then also it becomes the immediate object of attack.

Symptoms.—The complaint commences by appearances not dissimilar to a mild attack of inflammation of the bowels, but the pain is not so acute. There are usually cold extremities, heaving of the flank, a pulse quick and hard, but not very full, hot mouth, and commonly also some yellowness of the nostrils, eyelids, and tongue, which principally characterises it from other affections. It is sometimes, indeed, usually accompanied with costiveness, for the liver ceases to secrete, and the bile, previously formed, is not passed into the intestines, but becomes, from the increased activity of the absorbents, carried into the blood, and from thence is deposited on the

skin, which is the cause of the yellowness observed. But now and then, instead of a stoppage to the secretion, there is a diseased increase of it, and the complaint is, at such times, accompanied with a purging of black fœtid stools. A few years ago many cases of this kind fell under my notice about the same time, at the close of a very hot summer. In every instance the symptoms of fever are great, and the languor extreme; sometimes so much so, it is hardly possible to keep the horse on his legs. The progress of the complaint varies much; I have seen it fatal in three days, and I have known it continue three weeks, and destroy at last: in these protracted cases the horse in the end swells universally, and becomes anasarcous, or, as a farrier expresses it, he has water farcy. This disease is, as might naturally be expected, often confounded with an inflamed state of the bowels; and indeed it very often is connected with the inflammatory affections of these or some other of the abdominal viscera, from the general tendency observed in these affections to spread from one to another.

The *Prognosis* is favourable if the extremities are not invariably cold, if the weakness is not extreme, and if the pulse improves on bleeding: but if the languor increases, and the extremities cannot be got warm; if the breath is hot and fœtid, and the pulse small and beyond 120 in a minute, then it is extremely unfavourable.

The *Cure* should be attempted; first, by bleeding to the full extent of the powers of the animal, and the same repeated at intervals of four or six hours, if complete success does not follow the first. Blister the sides of the belly, and apply a rowel near the navel; or if preferred, apply a mustard poultice over the whole: but in this instance I should recommend blistering. The costiveness should be overcome by back raking, by clysters, and by the following, repeated every six hours till it operates:—

Calomel (*submuriate of quicksilver*) . .	one dram,
Antimonial powder	two drams,
Powdered aloes	three drams.

But in those cases where there is already diarrhœa or purging, the lancet should be used more sparingly; indeed, unless the inflammatory symptoms are considerable, and the state of the pulse shews a capability of bearing it, omit it altogether; but stimulate the belly by a rowel, and, if the heat is considerable, rub in some sweating blister (see *Mat. Med.*); and instead of the purging ball give the following:—

Castor oil :	eight ounces,
Gruel, or linseed tea	six ounces.

By the help of the yolk of two eggs beaten with the oil, and the gruel added gradually, a smooth uniform mixture may be made, and which will be found peculiarly useful to amend the state of the evacuations, and should be repeated every other day, giving the following ball also twice every day:—

Powdered opium	half a dram,
Calomel (*submuriate of quicksilver*) .	half a dram,
Powdered camomile	half an ounce.

Mix with honey to make a ball: no apprehension need be entertained that the calomel will increase the diarrhœa, as the opium will sufficiently restrain it. This treatment will be found singularly efficacious in this complaint; this caution only being requisite, that should the disease be protracted beyond the third day, the calomel must not be persisted in, for fear of salivation; but instead, a course of tonics with steel may be entered on for four or five days, and then again have recourse to the calomel, &c. &c., as an additional security against relapse. In other respects, as diet, clothing, &c. &c., treat as directed under inflamed bowels.

Inflamed Liver *in* Neat Cattle.

From the increased complexity in the structure of the liver in neat cattle, they appear more subject to hepatic affections than the horse; but these affections in them are more usually of a slow chronic kind; nevertheless now and then acute hepatitis appears, with all the symptoms that characterise it in the horse. Both varieties of the complaint likewise are observed, but cattle are more subject to that which is accompanied with diarrhœa, from the greater disposition in them to accumulate bile by the presence of a gall-bladder. In either case the treatment must be similar to what is directed for the horse, except that it would be prudent, in the acute kind accompanied with costiveness, to give a lessened dose of antimony, from the different degree of irritability in the one stomach to the other. The treatment of that which is dependent upon, or accompanied with, a vitiated state of the bile, must also be similar: on which subject more information likewise may be gained by referring to diarrhœa and jaundice in cattle.

I have never seen distinct hepatitis in sheep, though chronic affections of the liver are sufficiently common among them.

INFLAMMATION OF THE KIDNIES.

Nephritis.]

From the frequency of this complaint among horses, and from its fatal tendency, the consideration of it becomes an important matter; and it is rendered still more so, from the proper treatment not being understood by the common class of farriers. It has been said, that mares are more liable to it than horses, and horses more so to inflammation of the neck of the bladder: but my experience has not

justified this observation. Small as these organs are, they are very essential to life, and the quantity of blood passing through them is very great; therefore, we cannot wonder at their aptitude to inflame, nor the great derangement they occasion in the machine when they are so.

Symptoms.—The complaint is usually first observed by the animal being dull, and expressing pain by looking at his flanks; the urine is made in small quantities, and often red or bloody likewise; and, as the inflammation increases, it becomes in some instances almost wholly suppressed. The pulse at first is rather hard and frequent, with an addition to its fulness; but as the disease advances, it becomes smaller, oppressed, and intensely quick. The animal stands with his legs wide apart, as though going to stale, and shrinks when the loins are pressed. To distinguish it from inflammation of the body of the bladder, or from that of the neck of that organ, the horse should be examined by passing the hand up the rectum; when, if the inflammation exists in the kidnies, the bladder, whether empty or full, will not be hotter than the surrounding parts, nor more tender: but should the affection be confined to the body of the bladder, it will be surely found empty, but very hot and painful to the touch: if again, the neck of the bladder, as sometimes happens, should be the seat of the disease, the heat and tenderness will be considerable, and the bladder will be found distended with urine. During the continuance of the complaint, the horse shews a great disinclination to move about, the hinder extremities swell, and, what will often characterise the disease, is their aptitude to become paralytic and cold; and if one kidney only is affected, one leg only has been found paralysed and swelled*. The disease

* The following strongly marked case I have selected from among others noted by me, because it was one purely nephritic, and which, from being in my own infirmary, I had peculiar opportunities of noting: nor do I conceive it irrelevant here, because it is a simple detail of facts, and, as such, a clear guide to future discrimination. A very valuable horse, the property of John Inglis, Esq., was sent to my infirmary on the 24th of January, 1807, having been unwell since the 21st, with what was considered by the groom as a common cold; and as such it had been treated. He was so ill when he arrived, that my remark to the servant who brought him was, that I doubted whether he was not come to his last home; but so unconscious was this person of his situation, that he had ridden him from his master's stable, a distance of three miles. The animal was immediately bled, and put into a loose box, where he appeared very uneasy and in considerable pain, but he never was observed to look towards his loins, or gave other indications to shew the seat of the disease. There was great thirst, beating at the flanks, some cough, with frequent inclination to make a small quantity of water, after which some blood usually followed; but this appearance did not last more than two or three days, while the small evacuations of high-coloured urine continued throughout. On the next day after his arrival his pulse was 110, he exhibited a great dislike to the smallest motion, the near hind leg and thigh became cold, swelled enormously, and, by the third night, was completely paralytic; and it is remarkable that the near fore leg was also more cold than the off. So completely was the mobility of this hinder limb destroyed, that the poor animal never once changed his position, or attempted to lay down during the twelve days the disease lasted. On the 30th of January, this affected limb, however, returned to its pliancy, warmth, and capability of voluntary motion; but the off hind leg imme-

may terminate by resolution, by suppuration, or by gangrene. In *resolution*, which is what we should always aim at, the secretion of urine becomes increased, and of a thick whitish appearance; the pulse rises, the pain lessens, and a cessation of the other symptoms of fever occurs; the extremities also return to their usual size, pliancy, and mobility. *Suppuration* is, in the horse, not a frequent termination; the strength of the vascular system in him tends rather to produce *gangrene*, when the inflammation is very great; which termination is announced by the increased debility, by the weakness and intermission of the pulse, accompanied with cold sweats.

The *Causes*.—It is probable that it may sometimes arise, like the other topical affections, from a translation of general fever to these glands. It is more generally brought on from severe exercise, particularly if aided by the motion of a heavy or unskilful rider. It may be occasioned by the imprudent administration of acrid diuretic substances, particularly of such as are long continued. The application of cold is also not an unusual cause of it, as I have witnessed in horses turned out to grass without caution; nor is it

diately became affected in a similar manner to that in which the near had been, and remained in that state for twenty-four hours, when the swelling and paralysis as suddenly again left it, and resumed its station in the near or left hinder leg and thigh, and remained stationary there until the death of the animal, which took place on the 6th of February. About four days before this, a considerable remission of symptoms took place, and I entertained hopes of his recovery; but this fallacious appearance lasted only a few hours, when he relapsed into a more aggravated state of disease; the pulse became irregular and hardly discernible, delirium came on, and death closed the scene.

The treatment pursued had been active, and, I believe, judicious; bleeding had been pushed to a considerable extent; care had been taken to introduce no diuretic into the system, and external stimulants were actively employed; but from the first no benefit appeared to follow any part of the treatment: the complaint was fatally obstinate throughout, and such I have commonly found to be the case, when, unmindful of an incipient affection, a horse has been rode some distance, and perhaps exposed to cold when ill, as happened here; for, though he was found to be unwell on the 21st, he was imprudently ridden both on the 22d and 23d some distance, during two wet days, and, even on the 24th, he carried the servant who brought him up to me.

After death a very careful examination was made of the morbid appearances: less *general* inflammation was apparent than is common in horses who die of inflammatory affections of any of the abdominal viscera, which, in general cases, participate throughout more or less. The lungs, it was remarkable, had been early inflamed, and still bore some slight marks of the affection: indeed, I am disposed to believe they were the primary objects of attack; and that the injudicious riding on the 22d and 23d had translated the affection from them to the kidney. The left kidney only was diseased; but in this the inflammation had been so great, that it was become gangrenous even to a state of absolute rottenness. The right was but little affected; though there is no doubt but that, on the 30th of January, a metastasis had taken place, and the disease had been translated from the left kidney to the right. The remaining viscera, as before mentioned, were healthy, and the inflammation had communicated itself to the parts around less than usual. The paralysis evident in this and other cases may be accounted for, by considering that the inflammatory affection extended itself to the iliac nerves, which are situated in the immediate neighbourhood of the kidnies, and which nerves furnish the hinder extremities with nervous influence.

uncommon for it to follow a cold wet tempestuous night, even among such as have been out to grass before; the cold water lodging on the region of the loins appearing peculiarly hurtful to horses.

Mode of Treatment.—There are some circumstances in the cure to be particularly attended to, but which have been passed over unnoticed by our best English authors; on the contrary, many of them have recommended a practice almost certainly destructive *, by ordering different diuretic substances, which, from the difficulty that already exists in the vessels to separate the watery parts from the blood, it is evident must greatly aggravate the complaint.

As soon as the disease appears, bleed plentifully to the amount of four, five, or six quarts, according to the size, age, and strength of the animal; which, if the symptoms do not give way, repeat in four or five hours; and should the disease still remain violent, a farther bleeding should not be neglected. After the first bleeding, empty the bowels by raking, and afterwards by a clyster; and if there has been any appearance of costiveness, a purgative containing no diuretic substance should be given by the mouth also; and when the bowels are opened, clysters of gruel, or warm water, should be still constantly applied, which will act as a fomentation, and tend greatly to relieve the complaint. It is very necessary here also to excite an external inflammation over the loins, but we are much confined as to the means of doing this; for the use of Spanish flies is here inadmissible, from their disposition to become absorbed, and to pass unchanged through the blood, until they get into the kidnies, when they exert their stimulating effects, evidently in this instance, to the extreme prejudice of the animal. Turpentine, for the same reason, should not be used; but no such fear prevents the use of scalding fomentations, or of a hot iron drawn over the back, or of any diluted caustic: but the best means will be to apply a simple mustard poultice without turpentine, and to renew it every two hours; and, if the poultice is applied upon a newly stripped sheep skin, it will increase its activity greatly.

We have before had occasion to point out the great connexion that subsists between the skin and the kidnies, and to shew that when one is in a high state of action, the other secretes less; this being the case, it will be evident, that whatever determines the blood to the skin, or, in other words, whatever excites perspiration, must be highly useful: but it must not be forgotten, that this secretion is very difficult to excite, and that the exhibiting such medicines as would tend to produce sweat, would increase the action of the heart and arteries too much: but the clothing of the horse may be made warm; his legs may be bandaged up, plenty of litter

* Bartlet copying from Gibson, and treating of this disease, directs that if the secretion of urine should continue suppressed, to give nitre, turpentine, myrrh, and balsam capivi. Now, as the suppression arises from the continuation of the inflammation, this stimulating treatment would probably urge the kidnies into immediate gangrene.

allowed, and the stable kept moderately warm. Diluting liquors are inadmissible, on account of the distention they produce, for which reason the animal should be allowed but little to drink. To afford, however, some chance of operating on the skin, without increasing action, give the following:—

Powdered ipecacuanha	two drams,
Emetic tartar (*tartarised antimony*) . .	one dram,
Powdered opium	one scruple,
Mindererus's spirit (see *Mat. Med.*) . .	four ounces,
Camomile tea	eight ounces.

Mix, and give every six hours.

Inflamed Kidnies *in* Neat Cattle.

Red water, which is the cowleech's and grazier's name for inflammation in the kidnies, is still more common among horned cattle than it is among horses: in them it is sometimes primary, and, at others, connected with an inflamed bladder; while again, in some cases, I have observed it accompanied with an affection of the bowels also. These varieties make it not a little complex to the common practitioners: indeed, these cases are in general to them wholly incomprehensible, for one only circumstance arrests their attention, which is, that the afflicted animal has a difficulty in voiding the urine; and they immediately attempt to overcome this obstruction by forcing diuretics. In a celebrated publication on cattle we find, when treating on this disease, a quart of infusion of *pellitory* is directed to be given two or three times a-day. Mr. Clater recommends *camphor*, *oil* of *juniper*, and *salt* of *tartar*. By such forcing remedies, these inflammatory affections were very commonly pushed into gangrene; and a disease that under proper treatment would prove manageable, is by this injudicious conduct rendered fatal. If the physiology of the kidnies is attended to, as fully laid down in treating of the anatomy of those organs; it will be found that all diuretics act by forcing a greater quantity of blood through the kidnies; and, as inflammation also acts by increasing the vascularity of these organs, so the action of the medicine and the disease are one and the same.

The *Symptoms* of this complaint are, usually, considerable dulness, a great stiffness behind, and tenderness in the loins; the pulse is generally quick and seldom much fuller than natural, but presents a hardened stroke similar to what occurs in horses. The most prominent symptom, however, is the evacuation of urine, which is made in small quantities, and of a reddish colour; sometimes evidently mixed with blood: as the disease advances, particularly if it terminates fatally, the urine becomes darker and of a brown hue. It would always be prudent to ascertain the exact seat of the disease, as, in some measure, the applications must be different for one and for the other: the best mode of doing which is

to examine the beast by the anus, as directed in horses. When the bladder is also affected, the belly will feel hot and tender, and there will be a more frequent evacuation of the urine, which will seem to give intense pain while making, but which does not occur in nephritis.

The *Treatment* is little different from that directed for horses; bleed largely, according to the state of the animal and the duration of the disease, and, if there are considerable marks of fever, give antimonials, but no nitre. The following may be tried:—

No. 1.—Antimonial powder . . . . . half a dram,
Powdered ipecacuanha . . . . . one dram,
Powdered camomile . . . . . three drams.

Make into a ball with honey, and give twice a-day, washing it down with linseed tea, which also give to drink, but in small quantities only, for the reasons detailed in nephritis in horses. Stimulate the back and loins with the mustard poultice, or the sheep's skin, or apply them together.

I have likewise seen this complaint exist in a less acute form, so as to last some weeks, sometimes originating in over driving or blows across the loins, and not unfrequently from the effects of difficult calvings. In these more slow cases there is seldom any necessity for bleeding: a warm charge applied over the loins is very proper, and the following drink may be given every morning:—

No. 2.—Powdered catechu . . . . . two drams,
Mucilage of gum arabic . . . . . four ounces,
Lime water (see *Mat. Med.*) . . . . . six ounces.

In such instances a change of diet also is often useful: I once saw a cow greatly benefited by being fed wholly on carrots.

Sheep now and then have *red water*, both of the acute and the more slow kind: bleeding, housing, and feeding on any sweet root, as carrots, parsnips, or in default of these upon turnips, form the best means of cure, with the occasional use of one-third of the medicine No. 1, if the disease is violent.

INFLAMMATION OF THE BLADDER.

Cystitis.] [*Inflammation de la Vessie.*

The bladder may become inflamed throughout its whole body, or the affection may be confined to the neck of it only; and as different symptoms arise as either the one or the other of these are the immediate seat of disease, so we shall describe them separately.

There is reason to believe, also, that the bladder itself may be the subject of two varieties of inflammation; that is, its *peritoneal* coat in some cases, and its villous in others, may be the seat of the affection: but the former is usually the effect of some general abdominal inflammation; while the latter is a primary affection, and is that we mean to describe here.

Symptoms.—When a mucous membrane is inflamed, it ceases to secrete mucus; this takes place in the inflammation of the internal coat of the bladder, and when it ceases to secrete the mucus that was to defend it from the acrimony of the urine, it then becomes acutely irritable, and is constantly contracting. This complaint may be distinguished from inflammation of the kidnies, by what has been said with regard to that disease; and from inflammation of the neck of the bladder, from what follows.

As the inflamed bladder cannot long retain its contents, so there is a frequent evacuation of a small quantity of urine; and, on passing the hand up the rectum, the bladder will be found hot and tender, but empty; the horse is also commonly observed to have a disposition to dung frequently, as well as to stale, from the sympathy of the rectum with the bladder. The fever is usually considerable, and the pulse at first harder and fuller than natural, but as the disease proceeds it will become oppressed. Its *Causes* may originate in the translation of fever, perhaps sometimes by cold alternating with heat; and it has been occasioned in mares by the passing some irritating substance up the urethra to make them horsy.

Prognosis.—It may terminate by resolution; by an increased secretion of mucus; or by gangrene; the first of which is the most favourable, and the latter fatal. We must be guided, therefore, in our opinion as the symptoms tend towards either of these terminations.

Cure.—Bleed according to the height of the fever and state of the pulse, and repeat as these indicate; the rectum also should be immediately raked to empty it. Throw up clysters of warm gruel, or water, to foment the parts; and as soon as one returns, throw up another. It might not be improper likewise, if the subject is a female, to pass up a decoction of linseed with gum arabic by means of a syringe, to sheath the surface of the bladder from the acrid urine. As in inflammation of the kidnies, avoid blistering with Spanish flies, but stimulate the abdomen in any other way externally. Every thing that increases the flow of urine should be avoided, as it tends to irritate the bladder. The body should be kept warm to encourage perspiration, and the internal medicines may be the same as recommended in inflammation of the kidnies.

Inflammation of the Neck of the Bladder.

Sometimes the neck of the bladder takes on inflammation alone, and this occurs more frequently to horses than to mares. It is to be distinguished from inflammation of the kidnies, because, in passing the hand up the rectum, the bladder will be found distended:

this will also prevent mistaking it for inflammation of the body of the bladder. The frequent making of a little water will not, however, distinguish either of the foregoing complaints from this, as, in inflammation of the neck of the bladder, there is sometimes a small quantity of urine evacuated at different times: for after the bladder is distended, there will be, by the force of the distention, a few drops now and then squeezed out. But in this disease the frequent staling will not take place till the bladder is distended fully, whereas in the former complaints it will come on at the very first: and likewise, in the latter case, the distended bladder may be felt even by the belly.

The *Prognosis* in this disease will be more favourable in a mare than in a horse; but it will be unfavourable in both if the stoppage continues obstinate twelve or fourteen hours.

In attempting a *Cure*, the inflammation must be got under if possible; but if not, means must be taken to obviate the fatality of the symptoms. To promote the first indication, bleed very largely, open the bowels, throw up clysters, and stimulate externally, in the same manner as in the two last complaints. But if the inflammation does not subside sufficiently to permit the urine to pass, it must be drawn off by artificial means, or the bladder may burst; or the irritation alone may kill; or gangrene will come on. In a mare, from the urethra being large and straight, a catheter may be easily passed up, and the water drawn off: but, in the horse, to effect this, an opening must be made from the perinæum; yet this should not be done until the effect of passing the hand up the rectum and pressing on the bladder has been tried, which will often promote the expulsion: when this and every other of the usual means have been ineffectually tried, proceed to attempt the introduction of a catheter by the perinæum. By referring to the anatomy of the urethra, or passage into the bladder, page 252, it is there clearly stated why no sound or other instrument can pass into this cyst at once from the yard: but when it becomes necessary to force open the neck of it, a sound must be first passed up the penis until it reaches the thin membranous part of the urethra in the perinæum *there described:* the instrument then introduced must be cut down upon, and a sufficient opening made to introduce a catheter; which must be done very carefully and gradually, as the resistance is sometimes considerable; so much so, indeed, in some instances, that no efforts are sufficient to overcome the contraction of the inflamed part; in which cases, to prevent the evils arising from the distention, we must proceed to puncture the bladder itself, which may be done by means of a trochar introduced within the rectum, and which opening will not, in that case, penetrate the peritoneal cavity. (*See remarks on this in the Anatomy of the Bladder*, page 244.) It remains to add, that I have seen small continued doses of opium, as thirty grains every two hours, greatly relieve this affection, and this in more than one in-

stance: bleeding, also, till fainting was nearly produced, has relaxed the contraction.

Inflamed Bladder *in* Cattle.

This now and then occurs, though but very seldom. I have only heard it described, for I never saw the complaint; but it is evident that a corresponding treatment with that we have laid down for horses must be pursued.

INFLAMMATION OF THE WOMB.

This disease sometimes arises in *mares* a day or two after they have foaled, or at any time when abortion has taken place and they have slipped a foal. It is likewise not unfrequent in *cows*, under the same circumstances, as well as in *ewes;* and is frequently occasioned in all, from violence used in attempting the extraction of the foal, calf, or lamb.

It produces very similar symptoms to inflammation of the body of the bladder, and can only be distinguished from it by its happening at these times. There is usually the same frequency and pain in staling, from the bladder being affected by contiguity or sympathy, or from the pressure of the inflamed womb upon it. It is usually accompanied with shivering, marks of great distress, the extremities are cold, the pulse commonly oppressed, and the beast is much on the ground. Sometimes there is a flow of a coffee-coloured matter from the bearing.

It must be treated in a similar manner with inflammation of the bladder; but as the animal must have been previously weakened by the act of foaling, calving, or lambing, so the bleeding and general cooling plan should not be carried so far; nevertheless, if the inflammatory symptoms run high, and the subject is in full flesh, a proportionate bleeding must not be neglected. The bowels should also be opened first by raking, and then mild clysters must be frequently thrown up of a tepid temperature; and, in this instance, a purgative of Epsom salts is particularly indicated. Sometimes the bladder also becomes inflamed and irritable; at others, the neck of it only receives the affection; in which latter cases the urine must be drawn off by a catheter to relieve the distention (*see the last article*). Foment the belly at its posterior part with hot water, and support the strength with gruel or other nutriment; and in case there appears great irritation of the bladder, by the extreme frequency of the evacuations of urine, give opium in small doses united with antimonials, or the following:—

Tartar emetic (*tartarised antimony*) . . . one dram,
Powdered opium . . . . . one scruple,
Camomile tea, made strong . . . . . eight ounces.

Give this drink every four or six hours: if to a *cow*, put only half the quantity of emetic tartar; if to a *sheep*, only one-sixth of the quantity. In all other respects the treatment, whether for the one or the other of these subjects, must be the same; except that the artificial habits of the *mare* make it more necessary to keep her warm.

It remains only to notice on the subject of this class of diseases, that the pancreas, the spleen, the omentum, and indeed any of the contents of the abdomen, may become the seat of *primary inflammation*; but these instances rarely occur in the horse, and still more so in the ox or sheep; and when they do happen, the proper treatment will not differ from that laid down for the other viscera of the abdomen.

Class III.

Inflammation of Mucous Membranes.

CATARRH, OR COMMON COLD.

Catarrhus.] [*Morfondure.*

BESIDES the catarrhal fever, influenza, or epidemic catarrh, horses are subject to take cold at any time, and to have all the symptoms of common catarrh; being at such times a little off their feed, the coat staring, being chilly, and coughing frequently, with some little defluxion from the nose and eyes. I do not think that the human subject even is more obnoxious to common colds than stabled horses: but unless they are exposed in this state to some very injudicious treatment, these cases require only a little more clothing, avoiding exposure to currents of air, a moderate lessening of the corn, and substituting instead of a part of it, a nightly mash, with the following powder introduced:—

Tartar emetic (*tartarised antimony*) . . two drams,
Nitre (*nitrated potash*) . . . . . three drams.

If the complaint however seems to require it, bleed; and the mo-

ment the symptoms become urgent, refer to catarrhal fever, and treat as there directed.

The *hoose* in cattle is nothing more than an accidental *cold* taken; in which they should be housed a few days, and have grains or mashes, with the above powder, giving to them only one quarter of the quantity of emetic tartar.

THICK WIND.

For the sake of order and method, I shall consider this subject separately; otherwise, thick wind, broken wind, and chronic cough, are very intimately allied in both cause and effect. All inflammatory affections of the chest are very prone to leave the *wind* affected; or, in other words, to leave the lungs in such a state as that respiration shall not in future be carried on with its accustomed facility and regularity. Thick wind may also be produced by other occasional causes, as immoderate exercise when the stomach is distended with food or water; and it sometimes seems to arise from predisposition, and hence is found most frequent in horses with great appetites, with foul feeders, and such as fatten upon little food. In broken wind there is frequently an evident rupture in the air cells; but though thick wind is frequently a precursor to broken wind, the air cells are not found to be ruptured in this case. In some instances I have not been able to detect any morbid appearances in the lungs of thick-winded horses after death; but, in others, there was an evident thickening of the membranes, and a lessening of the capacity of the air cells by a deposit of coagulable lymph within them. This latter state may be commonly traced to some recent inflammatory attack, in which the lymph is thrown out, when, not being immediately absorbed, it becomes organized: and on these grounds the difficulty of breathing, and the acceleration produced, may be easily accounted for, as it is evident that this decrease to the capacity of the air cells renders it necessary for the air to be more frequently taken in; because, being acted on by a less surface, the blood is not sufficiently oxygenated; and a sufficient number of air cells not being expanded, a sense of fulness in the right side of the heart, induces the animal to make hasty *in*spirations to remedy the defect, and consequently hasty *ex*pirations: the obstruction to both being equal, the inspirations and expirations are equal; which serves to distinguish it from broken wind, in which there is no obstruction to the *entrance;* therefore the breath is drawn in with ease, but *expelled* with difficulty.

A *roarer* is so denominated, when the coagulable lymph is thrown out in bands across the trachea or windpipe; or, in some cases,

one mass narrows the tube. I have seen the diameter even reduced to one-third of its original dimensions. It is not improbable that the custom of grasping the windpipe, as practised by dealers to try the soundness of the wind, may sometimes produce inflammation, and even occasion this very affection. What regards the medical treatment will be given when the other subjects connected with this are finished.

BROKEN WIND.

[*La Pousse.*

Though thick wind often leads to broken wind, yet there are some considerable differences between them. The peculiarity of the latter; its consequences rendering the animal nearly useless; and the certainty of its never leaving him; have made it a subject of much experiment and more conjecture. The older writers ascribed various causes for it. From the peculiarity of a broken-winded horse being subject to pass much wind by the anus, the ignorance of the times induced the practitioners of that date to imagine that some communication existed between the lungs and fundament; and therefore they made an artificial opening to draw off the superfluous air, and the unoffending animal was made to endure two evils instead of one. Gibson attributed it to an enlargement of the contents of the chest. Dr. Lower conjectured that it arose from a rupture of the phrenic nerve. Many have considered it as simply an asthmatic affection; and Mr. Coleman has asserted that it consists in a mechanical rupture of the air cells. On examination of the lungs of broken-winded horses, there is sometimes not much difference to be observed between them and healthy ones; but there is always some emphysematous appearance, commonly it is considerable, and much air is diffused throughout the parenchymatous substance of the lungs: sometimes there are little vesicular appearances over the outer surface. That air is diffused within the substance, and not wholly pressed out by the last expiration, is farther proved by the circumstance of the lungs not collapsing when the cavity of the chest is opened. When air, therefore, is inspired in broken wind, it finds no difficulty of *entrance;* but being diffused and entangled among the cellular tissue, it finds a difficulty in being *expired;* and this makes the expiration much longer than the inspiration, and the horse is seen to do it at two efforts: by the first, he appears to empty the air from the cells themselves; and by the second more forcible contraction, which is operated by means of the abdominal muscles, the lungs are pressed on to endeavour to force out the extravasated air from the cellular membrane.

Causes of Broken Wind.—Some of these are involved in considerable obscurity, others of them are sufficiently plain and apparent.

The urgency of the symptoms of broken wind being very unequal at times, renders it clear that there must be some additional cause for the peculiarity of breathing besides the mechanical rupture of the air cells; for some horses with this complaint will, on particular days, move quickly without pain or distress, but, on others, can hardly go beyond a walk, their respiration is so much oppressed. In these instances there is evidently an asthmatic affection of the lungs superadded to the extravasation of air; and which extravasation, it may be remarked likewise, is not always sufficiently evident in the lungs when examined, after death, to have accounted for the violence of the symptoms. That a morbid tendency exists in some horses to become broken-winded; or, rather, that the lungs of some appear to be predisposed to take on a disease that shall produce appearances not very dissimilar to human asthma, is certain: and, further, this tendency seems wholly distinct from the mechanical rupture of the air cells, brought on by acute causes, as distention, inflammation, &c. Gross feeders, horses who fatten on little food, of sluggish easy dispositions, and, I think, short thick-made horses of low breeding, are all of them peculiarly liable to the disease. In some of these it comes on very slowly, being preceded by thick wind and chronic cough; in others it is rapid in its attack. Nevertheless it must be admitted, that no age, sex, or kind, is exempted from it; but, in all, it may be produced by inflammation of the chest: the manner in which it is brought on in these cases is fully explained in treating of peripneumony, to which I would particularly refer the reader. The suddenness of the attack of broken wind is sometimes very striking: three days have confirmed it in a horse previously unaffected, and without any known cause. These instances are, however, comparatively rare; for when it cannot be traced to either a constitutional liability, as before noticed, to an acute inflammatory attack, or to chronic cough; it is brought on by some improper management, as exercising violently, particularly on a distended stomach. The ignorant custom of galloping after drinking water *to warm it in them*, may produce it: for at these times the diaphragm not being able to descend from the distention, the blood at the same period being accelerated in its motion from the exercise, a very forcible inspiration is necessary to expand the cells, and to permit the passage of the blood from the right side of the heart, through the lungs to the left side; but the lungs not having room for a sufficient expansion, the cells become ruptured and the air extravasated. It is evident also, that horses unaccustomed to violent exertions are more liable to be injured in this way, in case of being injudiciously exercised, than others; for their air cells are probably less elastic than those of horses in full wind and condition. The treatment of this complaint will be considered at the end of the next article.

CHRONIC COUGH.

[*Toux.*

Coughing, considered as an action generally, is a violent effort of the diaphragm, intercostal, and abdominal muscles, producing a forcible expiration of the air from the chest, with such violence as to remove any extraneous body that may intercept the free passage of the air. Considered as a mark of disease, whenever it accompanies a general affection of the constitution, it may be regarded as simply *symptomatic*, and the cause must be attended to for its removal. And though a chronic cough is no less symptomatic of some affection of the air passages, yet as it is the only prevalent symptom, the mitigation of which removes most of the ill effects of the complaint, so it is in this instance *primarily* attended to. Chronic cough is a very usual attendant on thick wind, and on broken wind, and likewise accompanies glanders and pulmonary consumption. But besides these, there is at times, and without any difficulty of breathing, the horse eating well and thriving, yet a permanent cough, usually more considerable in the morning and evening, after meals, and on any violent exertion, particularly also on first going out to exercise. A cough of this description is very common, and it will remain in this state, without otherwise affecting the horse for years, sometimes even his whole life. In other instances it does not end in so harmless a manner, but upon any occasional cold becomes aggravated; at each cold becoming worse and worse, till at length the wind becomes affected. The effects and the termination of chronic cough are dependent, in a considerable degree, upon the cause producing it. From what has been said of the terminations of peripneumony, it will be seen that an irritable state of the bronchial passages often remains after that disease, as well as after the catarrhal affection: in which cases any change of atmosphere excites these irritable parts into action; thus the horse coughs whenever he moves out of, or into, the stable; for the air inspired is either colder or warmer than what was before breathed, and hence becomes a source of irritation. Drinking cold water produces the same effect, for a similar reason. Any hurry or irregularity of motion does the like, because it propels more blood towards the chest, which cannot bear the increased stimulus. In some cases the irritability of the bronchial membrane itself does not seem so much increased, as that the mucus secreted from it appears altered, either in quantity or quality. It may become inordinate in quantity, as is often observed, and such horses, when they cough, throw off much of it by the nose: or it may be more acrid in quality, and hence prove a source of continual irritation. In other instances, the inflammation arising from catarrh or peripneumony appears to have thrown out masses of lymph, which,

though they may not be sufficient to obstruct the air passage, and make the horse a *roarer;* yet they may prove a source of irritation, and produce cough. That such is the case, we know by what now and then occurs after such inflammations, in which the cough continues some time until these masses are absorbed, or forced up by the violence of the cough: and it is by assisting the separation of this deposit, that expectorants act in relieving this complaint. Another cause of chronic cough arises from worms within the stomach and bowels, which produce their effects by a sympathy existing between the stomach and bowels with the lungs; probably through the medium of the great sympathetic nerve, as we have explained in *Neurology*.

The *Treatment of Thick Wind, of Broken Wind, and of Chronic Cough*, must be in essentials the same, and may be considered however as of two kinds, the one *palliative*, the other *curative*. Thick wind and chronic cough may be sometimes cured [illegible] as they are apt to end in broken wind, which is never cured, so our endeavours should be actively turned towards removing them. In horses naturally gross, living high, without much exercise, and feeding foully, our attempts must be directed to lower their general fulness of habit, by bleeding, exercise, and more moderate feeding. If at grass, a less luxuriant pasture should be chosen; many a horse becomes broken-winded from gorging himself with too much grass; while, on the contrary, another, who is much affected in his wind in the stable, becomes much relieved when out upon a short bite, or pasture not luxuriant. In the stable, such a horse should be muzzled at night to prevent him eating his litter, and his water should be given in moderate quantities only: all sudden exertions likewise should be as much as possible avoided. Such horses can trot or gallop with ease and safety, but it should not be at once pressed upon them, from a state of previous rest, or the wind may become irretrievably broken. Occasional coughs from colds may be removed by treating as directed under *common catarrh*, page 391: but when the cough is of longer continuance, or in case of thick wind, the following may be tried:—

No. 1.—Calomel (*submuriate of quicksilver*) . . . one scruple,
Gum ammoniac . . . . . two drams,
Balsam of Peru . . . . . one dram,
Powdered squill . . . . . one dram,
Horseradish, bruised . . . . . two drams.

Make into a ball with honey, and give every morning fasting. In some cases the following has been found efficacious:—

No. 2.—Tar water (see *Mat. Med.*) . . . . . half a pint,
Lime water (see *Mat. Med.*) . . . . . ditto,
Powdered squill . . . . . one dram.

Mix, and give every morning. To either may be also added, with benefit, in some instances, as an additional expectorant, one or two drams of *tartar emetic*.

I have seen chronic cough and thick wind both benefited by a course of mercurial physic; but the cough in such cases was probably dependent on worms: and whenever a continued cough exists, with irregular appetite, or unthrifty coat, it is more than probable that they are the real cause of the cough. (See *Worms.*) In chronic coughs the best effects sometimes follow from feeding with carrots. Turnips, parsnips, beet, and potatoes, may be tried, where carrots cannot be got; and a mash with bran and linseed may be occasionally given; or, a malt mash sometimes proves beneficial. In those cases of thick wind, or cough, where it may be suspected to be dependent on coagulable lymph deposited within the trachea or air tube, the rubbing in of mercurial ointment its whole length, for a week, would be advisable, and then to blister the like extent of surface. The same is also proper in the beginning of the affection called roaring.

In *broken wind* the treatment can only be *palliative;* but it is most unfortunate that so great a prejudice exists against horses in this state, that they are commonly abandoned to the lowest uses; whereas, with moderate care, they may be rendered equal to most purposes. Attempts at cure have always failed, for the air cells cannot be again made whole: our endeavours, therefore, can only be directed to mitigating the symptoms. The first care will be to prevent over-repletion of the stomach, for this, in every case, will greatly aggravate the difficulty of breathing: the second is, to avoid over-distention of the lungs by too violent and too sudden exercise. By carefully attending to these two principal indications, a broken-winded horse may be rendered comfortable to himself, and useful to his owner. To fulfil the first indication, the food should be regularly given in moderate quantities only; but most particularly it should be such as contains much nutriment in a small space: hence corn is more proper than hay, and, above all, I have found a manger food composed of one part bran, one part bruised beans, and two parts bruised oats, agree particularly well: on a sufficient quantity of this food a horse will need but very little hay, and what he does have, should be of the oldest and best kind; and, when they can be got, carrots, chopped and mixed with the manger food, will often be attended with a most salutary effect on the wind, particularly as it will render less water necessary. Turning out to grass, commonly aggravates the symptoms of broken wind; but a daily run on a very short pasture is generally found advantageous in these cases: water should be sparingly given, and without this caution all the others are useless; whatever also is allowed should be given by measure, for if a horse, under this affection, is allowed to drink his fill at a pond, he will almost burst himself, so great is the greediness after water on these occasions. But this debarring from drink should never be such as to border on cruelty; neither is benefit derived from it, but the contrary. Four quarts may be given morning and noon, and six quarts at night; and when the exercise and perspiration are considerable, something more on that account should be

allowed. By judicious management, and the exercise of a little humanity, much may be done in these cases; and if the sufferings of this valuable animal are considered when a different course is pursued, I should hope that it is ignorance, and not obstinacy, that dictates it.

Modes of distinguishing Soundness and Unsoundness of the Wind.

These various affections of the *wind* are very important to the veterinarian, nor can he be too well informed of the appearances that characterise each distinctly; because, as their existence affects the level soundness of horses, so he will be very often forced to decide peremptorily on very slight appearances. With regard to *thick wind*, it is not every horse who heaves at his flanks that is permanently thick winded: he may have an occasional cold; the stable may be unusually hot, or other accidental causes may have operated to produce it; of the probable existence of all or of any of which he should inform himself before he decides: but if, by strict inquiry, he can ascertain that, under every circumstance, and in the absence of every occasional excitement, the horse he examines breathes always quicker than natural, he may safely decide that he is *unsound*; and this the more surely, if a brisk trot increases the heaving beyond what it would in a perfectly healthy horse. Much stress is laid on the *sound of the cough* by dealers and other persons about horses, and it is with considerable justice that it is so considered. When a perfectly sound horse is made to cough, he produces a shrill whistling noise; and the effort seems to arise from the upper part of the neck: however, there is little reason to doubt but that in cases of pressure of the hand on the windpipe to produce cough, that the muscles of the larynx act upon the part pressed on, and that such cough is more immediately produced of that determinate sound than at another time; and this is so certain, that a horse shall have an occasional cough on him that does not sound so pleasantly as a judge would wish, and yet, when coughed by pressure, he shall produce a satisfactory effort; for in the one instance he coughs naturally from the parts affected, which are the bronchial passages; and in the other from the upper part of the throat. Nevertheless, a considerable dependence may be placed on the *sound of the cough*, which should be, as before described, a light whistling expiration, coming evidently more from the throat than the chest. There is also a firmness with fulness in the cough of a sound horse, and he clears his nostrils after it usually by snorting: while, on the contrary, in the permanent cough, and more particularly in that which betokens any actual affection of the lungs, the cough is deeper, and more deeply sonorous: if the horse is really broken winded, or bordering upon it, it is particularly short, and sounds more like a grunt than a cough. Such a horse will also give a half expiration, or kind of grunt, when turned quickly, or when struck, which is a usual method of trying the wind. *Roaring* may be immediately detected by a brisk gallop, but the person who is to judge of its

existence should be on the ground, and the horse should pass him several times, but without restraint; for I have seen horses whipped into a momentary cessation of the roaring.

Broken wind can hardly be mistaken; the cough accompanying it is always of the short deep grunting kind: such a horse also is peculiarly flatulent, and breaks wind most frequently; but the principal peculiarity, whereby to draw a judgment, arises from the beating of the flanks. These are not so much quickened in their action, as they are rendered remarkable by their operating in respiration or breathing, by *three* efforts instead of *two*. In the first, the air is drawn in naturally, and the flanks fill up as usual; but in the next, the falling of the flanks, again to expel the air, is most unusual, for it is not done with a gradual sinking in of the muscles, but at once by a momentary effort, leaving a line across the flank; and then the third effort takes place, which is a slow but strong drawing up of the muscles of the belly to press out the *extravasated* air, as we have explained. Broken-winded horses are also observed to be peculiarly greedy after water, which also characterises thick wind when confirmed; and in broken wind a little hurried motion distends the nostrils, and produces evident distress.

SORE THROAT.

Cynanche Tonsillaris.]

Horses seldom have the tonsils and pharynx inflamed but under the attack of catarrhal fever: when, therefore, a horse is observed to sip his water, shaking it about with the lips, and readily inclining his head towards it, but with an evident fear of swallowing, it may be known that a soreness of throat is present; and the fact will be still more certain, if, when he chews his hay, he lets fall the chewed mass, which is termed *quidding* his food. As it is always connected with a febrile affection, so it can only be properly treated in conjunction with that. See *Catarrhal Fever*.

GLANDERS.

[*La Morve.*

This fatal and loathsome disease has long been the scourge of this noble race of animals; and there is reason to fear that some time may yet elapse before we shall find an antidote to what we now know to be a specific poison, equally common to this complaint, and to that called *farcy*. It is not certain to whom it was indebted for this name among us, nor whence its derivation, nor at what time it

was so named; but it does not seem to have received any particular appellation, either with us, or our neighbours the French, till the restoration of learning after the irruption of the Goths; for we find some of the French authors disputing what disease Vegetius meant, when he was evidently describing glanders under a term that, when translated, signifies *humidity* or *moisture*. He speaks of it as a viscid white matter running from the nose, of a bad smell, accompanied with moisture from the eyes; a haggard countenance, and dry harsh hair; it was added, that, when this running became bloody, the disease was incurable*. It is likewise described in the celebrated work of Ruini, in 1618.

The antients formed the most vague opinions concerning this complaint, nor was their treatment less so; and among the old English farriers the absurdity lost no ground. De Gray says, a horse must be first cured of sundry complaints before the glanders can be cured, as consumption of the flesh and lungs, aches in the head, diseases of the liver, pursiveness, hide-bound, swelled legs, &c. Solleysel and Blundeville supposed its seat was the spinal marrow, which was wasted by its effects; others thought the brain was exuding through the frontal sinuses. Neither Gibson nor Bracken had any correct notion of this disease: the latter seems to consider it as the remains of a cold, confining its attack to the glands of the throat, and denies its being infectious; directing, as a cure, *balsam copaivi*, *eggs*, and *white wine*; at the same time advising the use of stimulating injections up the nostrils. The fatal tendency of this malignant disease stimulated the industry of the French, many of whom attended minutely to it; and, as human surgery was more advanced, it is probable their ideas were guided principally by analogy, and their practice directed accordingly; and it is more than likely that the treatment of *ozena* in the human subject first gave La Fosse the hint to attempt the cure by injecting the nasal sinuses; though it is said that this experiment was first tried some years before in England; but of this I am by no means certain.

Both the younger and elder of these industrious veterinarians have taken very great pains to ascertain the nature and cause of this complaint. In 1749, La Fosse the elder, demonstrated before the Academy of Sciences in Paris, that the seat of this disease was wholly in the pituitary membrane, and he, therefore, proposed as a cure the injecting the whole surface of this membrane, by openings to be made with the trepan into the frontal, nasal, and maxillary sinuses. This memoir was translated into English by Bartlet, and the same experiment was made by various persons, particularly by Snape, farrier to the king; but I am not aware of the practice being carried to any length. La Fosse the younger informs us, that the farriers of that time were enraged at the discovery, and, so far from endeavouring to examine into the truth of his evidence, they obstinately per-

* A late author was not aware of this, probably, when he asserted that glanders and the venereal disease bore the same date in medical annals.

sisted in the antient opinions, that the seat of the disease was in the lungs, the kidnies, or the liver. In 1752, La Fosse senior presented another memoir to the Royal Academy of Sciences, in which he more fully explained his theory, and presented many new facts. In this treatise he divided the disease into seven different species. The younger La Fosse pursued the matter, and, in 1759, he gave some public demonstrations on this subject by order of the French government; and in 1762, he presented his first memoir on the same to the academy, in which he did little more than establish his father's former opinions. The result of these discoveries went to prove, that the glanders was a specific affection of the pituitary membrane, affecting all the nasal cavities and its dependent sinuses; that though every appearance of mucosity from the nose was denominated glanders, two only were specific affections; and that the disease is so truly an affection of the pituitary membrane alone, that any inflammation of this part, if long continued, may degenerate into it: hence he has seen fractures of the bones of the nose produce it; a long-continued catarrh likewise; the strangles may also terminate in it; and, lastly, as full proof, both himself and father have produced it upon a sound horse by acrid injections up the nose *. It was the opinion of these authors, that this disease was only to be cured by local applications, and those must be applied to the whole affected surface of the membrane; to come at which they recommended the penetrating the nasal, frontal, and maxillary sinuses; but though, in a few instances, it appeared to prove useful, yet the event did not justify their expectations.

M. St. Bel, the late professor of our Veterinary College, likewise published his remarks on this disease; but it is evident that he knew little or nothing relating to it but what he gained from La Fosse, and consequently his opinions offered nothing new. The present professor has prosecuted the subject much farther, and, by an extensive course of experiments, has thrown very considerable light on the nature of the affection; and though we are not now much more successful in attempts at the cure, yet we have, perhaps, less reason to despair. The venereal disease, to which this has by almost every later writer been compared, is a specific affection, and for a long time committed its ravages without a prospect of relief, but at length mercury divested it of most of its horrors, and proved a specific remedy for the syphylitic poison: nor need we be less sanguine with regard to this complaint, which is not more obstinate, nor more rapid in its progress, but less so; and though we have not hitherto succeeded in detecting the *antidote*, we should not be deterred in our search after it; for we are justified by analogy to hope that a specific remedy does exist, and that we shall yet become possessed of it. (*See this subject pursued in the Treatment.*)

* These authors were, in general cases, sufficiently correct; but our experiments and observations do not go so far, I believe: glanders has never been thus artificially generated with us; nor have I ever seen it follow catarrh, strangles, or accidental wounds of the nose.

The modern improvements in the veterinary art have taught us, that glanders and farcy are dependent on a poison *specifically* the same; but that the *seat* of the one is not the same with that of the other. The experiments that have been made set this matter beyond doubt; for horses have been inoculated with the matter of farcy, and glanders has been the result: glanders has also been produced by inoculating with the matter of glanders, which M. St. Bel asserted could not be done: farcy has been brought on likewise by inserting the matter of farcy: and, lastly, the artificial introduction of the matter of glanders has occasioned a true appearance of farcy. It has, however, been inferred, that because these two diseases are so different in their situations, they must be essentially different in their natures; but in answer to this, had not even numerous experiments and established facts already set this matter clear, still it might have been urged *a priori*, not only that every poison has its preference of situation, but likewise that the same poison, under different modifications, affects different parts. The first and secondary attacks of syphylis are very different, and the parts they affect remote from each other. The poison of the plague inflames the lymphatic glands, but it is by no means certain which of them it shall attack. It may not unaptly be added, that it is sufficiently notorious that farcy always proceeds in the course of the lymphatics, and observation has proved that glanders, when it produces ulcers, proceeds in the line of the absorbents of the nose.

To Mr. White, of Exeter, the veterinary world are much indebted for his attention to this important subject: the numerous experiments he has recorded, and the interesting facts he has detailed, all go to prove that glandered matter will produce both farcy and glanders; and that the matter from farcy will likewise occasion either the one disease or the other. When the matter of glanders is introduced under the cuticle without occasioning any flow of blood to liquefy or neutralize the poison, a slight swelling is produced in a day or two, and in another day or two a purulent discharge takes place; after which the lymphatics of the part become inflamed and corded, as in farcy. The original sore will soon assume the appearance of a true farcy bud or ulcer, and similar ones will also follow in the course of the absorbents: in short, the disease will take on every characteristic of genuine farcy. Soon after, matter begins to flow from the nostrils, the lymphatic glands under the jaw become enlarged, and every feature of perfect glanders also appears in full force. Exactly the same will occur, if the matter of farcy is used for the inoculation instead of that of glanders.

But though Mr. White's own experiments tend to shew the specific similarity that exists between farcy and glanders sufficiently clear, yet he appears, in another part, to consider farcy as a *local* disease, but glanders always a *constitutional* one. I cannot but regard both these views of the matter as somewhat erroneous; for, although the fact is certain, that the extirpation of a farcy bud will often destroy all further progress of the complaint; so will the de-

struction of the syphilitic chancre, there is reason to believe, in some instances prevent the future progress of the venereal virus: but no prudent surgeon would trust to it. On the other hand, I believe, there is no doubt also but that the effectual cauterization of a glandered sore of late standing, and artificially created, may prevent any future symptoms of the malady in many instances. These circumstances will occur equally in both diseases in the very early stages, but in neither do they happen in advanced periods of their existence, and consequently no difference between the two can be deduced.

Glanders appears to kill by the hectic irritation it occasions in the constitution, or it destroys by diseasing the lungs: not unfrequently also both these causes operate in the same subject; but diseased lungs are invariably present in every case more or less, as is proved by dissections of innumerable subjects who have died of it. When horses have been killed early in the disease, the lungs have been found merely affected with tubercles; but when the animal has been suffered to die from the effects of the complaint, these organs have been always found much ulcerated. Indeed, there is reason to suppose that the malady does not begin to exert much of its noxious influence on the general health, until it has attacked the lungs; but as soon as it has affected them, its progress is very rapid. As this translation from the nose to the chest is sometimes slow, particularly in strong and otherwise healthy horses; so it serves to account why the disease makes such little progress in some cases to what it does in others; the poison itself may also be less virulent in some instances.

That *glanders is contagious* there is no reason to doubt, but the degree in which it is so has been disputed; nor shall we, perhaps, readily come at the truth, until a vast number of accurate experiments have been made on this very point. I formerly thought it more frequently engendered than caught, but a very extensive experience has since disposed me to consider it as more frequently taken by contagion than engendered within the constitution. But though this is sufficiently interesting; it is even of more importance to determine *how* the contagion is communicated, which has hitherto been differently accounted for, and is not yet satisfactorily explained. I have seen much of it in the army and in other situations, and watched its progress attentively; but as I happened to be always denied the opportunity of much experiment, I have not been able to satisfy my mind entirely on this point. Mr. White's experiments go to prove, that the simple contact of glandered matter, applied to a surface neither abraded nor inflamed, will not produce it. It has even been put up the nose, and retained there, without occasioning any ill effect; and though this is in direct contradiction to what occurs in the venereal virus, which will communicate its effects through the medium of any healthy mucous membrane; yet it corresponds with what I have observed; for I have also rubbed the matter on various parts of the body, and introduced it under the eyelids

likewise, yet no ill consequence ensued: but on rubbing some glandered matter into the greasy heels of a horse condemned to the dogs, farcy soon appeared.

The air has been supposed a medium for contagion, particularly the air of the stable; but this I always considered as very unlikely, and further experience has convinced me that the *air alone will not convey the contagion of glanders.* Mr. White informs us he had the opportunity of putting this to the test of experiment, by keeping a sound horse and an infected one in the same stable, but perfectly free from actual communication; the event was, that the sound horse received no injury from his diseased companion: and though not one or two, nor indeed several individual instances, would establish the fact incontrovertibly; yet this much even greatly strengthens the opinion formed. This gentleman further conjectures, that the general source of contagion arises from the glandered matter being received into the stomach; and the experiments and facts he details, make this appear to be really the case. If the air cannot be infected, and if the simple contact of matter, to an uninflamed or unabraded surface, will not propagate the infection, it seems very difficult otherwise to account for its being so highly contagious as we know it to be; for we cannot for a moment suppose that every horse, out of the number of those who become affected, can gain it by inoculation; that is, by an accidental application of the poisonous matter to a sore or abraded surface. Future experiments, however, on a large scale can only determine this; in the mean time, what is known, and here detailed, will enable the veterinarian to give his preventive directions accordingly.

From the appearances that sometimes occur, there is reason to suppose that glanders now and then puts on an acute form also, and rages as an epidemic: such has been observed among horses emaciated by a long voyage, or after a severe campaign. In one instance, where the hatches of a dragoon troop ship were forced to be closed on account of tempestuous weather, it was said, this form of acute glanders broke out, and destroyed numbers in three days only. I think it, however, not improbable that this might be a very malignant form of catarrhal fever.

The *Symptoms of Glanders* are an increased and diseased secretion from the membranes of the nose, which continually flows in small or large quantities. This discharge is seldom at first perfectly purulent, but is more glairy, thick, and not unlike the white of egg, and it sometimes continues thus for a long time; at others it soon becomes purulent, but even then there is always a degree of viscidity and gluiness in it that sticks the nostrils together, as it were, from its tenacity, differing from other pus, and which very strongly characterises the complaint. As ulceration takes place, the discharge becomes bloody, sometimes sanious and offensive, which is always the case when the bones prove diseased. From an absorption of the matter from the nose by the lymphatics of the part, the glands under the jaws, through which these vessels pass, become swollen and

tender, and, as one side of the head only is sometimes affected with the glandered running, in such case one lymphatic gland only is tumefied, and of course the one of the affected side. These glands are called *kernels* by the farriers, and their being enlarged or not enlarged is, with them, a criterion of the existence or non-existence of the disease: but though in long-continued glanders they are very generally enlarged, yet in mild cases they are not invariably so; and again, there are other complaints beside this that will tumefy them. The increased secretion from the inflamed membrane in common catarrh will sometimes do it; and the same occurs in strangles. Still less can any *certain* criterion be drawn from the circumstance of their being attached or detached from the jaw bone, though, when they become much swelled in virulent glanders, they certainly are not so loose and free from confinement within the skin. Nevertheless, the enlargement of these glands may serve as an auxiliary proof of the existence of the complaint, but must not be relied on as a definitive one. The disease sometimes remains long without producing ulceration, and cases of this kind prove very puzzling to the practitioner: at other times, on the contrary, an ulcerating process quickly appears; and I believe that such does eventually take place, sooner or later, in every case. These ulcers have a very peculiar character, and their appearance cannot be too attentively studied by the veterinarian: they are not unlike the venereal chancre, but usually commence by small limpid bladders, which soon ulcerate into a sore of a particular kind; and when there are several of them, they are always placed in the course of the lymphatics. Sometimes the ulceration exists so high up, that it is very difficult to discover them; yet, with the head held up to a full light, more particularly towards the sun when shining, they may be detected if within any moderate distance. Very great caution is likewise requisite in giving a prompt decision from the existence of these alone; for sometimes a portion of the matter will adhere to the nasal surface, and much resemble ulceration: and had not the error actually occurred in the practice of more than one veterinarian, I should be almost ashamed to insert a caution, that the opening of the nasal duct, which brings the superfluous moisture from the eyes, may not be mistaken for a chancre; the situation of which is towards the posterior and lower part of the nostril (see *page* 185). As the disease advances, much of the surface of the schneiderian membrane becomes ulcerated, till at length even the bones prove carious. At an uncertain period of the disease, which occurs sometimes much sooner than at others, the lungs become affected, when hectic symptoms soon follow: there then appears cough, emaciation, and weakness in the loins; the hair feels dry, and falls off on being handled; the matter from the nose increases in quantity, becomes sanious, stinking, or bloody, and in this state the animal dies.

From the very serious effects that follow the spreading of this disease, the veterinary practitioner is often called upon to give a prompt and definitive opinion relative to it; and how very necessary

it is for his own reputation, and likewise from the consequences that may ensue, that he should be enabled to do this, the following case in my own practice is calculated to shew. Some years ago I was requested to attend at a market town in Sussex, to examine a horse suspected to be glandered, and whose situation had occupied the attention of not only the whole town, but of the entire country around; and *action* upon *action* depended upon the result; for the owner had pertinaciously persisted in introducing this horse wherever he went. At last, such an outcry was raised, that the farmer and his horse were literally pelted out of the town. A penal process was threatened against him for danger incurred, and he had rebutted, by having already commenced an action for an assault. The neighbourhood were generally interested in the case, but extremely divided in their opinions; and on my arrival, which I found had been purposely fixed for the market day, I was literally surrounded by a motley group of not less than two hundred persons. The unfortunate object of my examination was stationed in a bye lane, tied to a tree, a quarter of a mile without the town. It proved to be one of those intricate cases, hereafter detailed, of a peculiar morbid excitement of the schneiderian membrane; but having been much in the habit of examining glandered troop horses, I was less at a loss than I might otherwise have been: after, therefore, attentively examining the animal, and having gained all the collateral evidence in my power, I decided that it was not a glanderous affection, but that irritability and increased secretion before hinted at; and I afterwards learned that the event justified the opinion, to the extreme triumph of the farmer.

In numerous other cases also, a necessity will often exist for a prompt and correct opinion on this subject; it therefore behoves the junior practitioner to make himself as familiar with the complaint as possible. The principal intricacy that will present itself, arises from the similarity of appearance that frequently exists between the true disease and an effect arising from long-continued or often repeated colds. In present colds the difficulty cannot be great, for the general health is commonly affected; there is a loss of appetite, some drought, and a cough, which seldom are seen in the early stages of glanders, and the more advanced states require but little to distinguish them: and though in colds the submaxillary glands are sometimes swelled, yet they are in these cases hot and moveable. But when colds have been often repeated, or have continued a long time, a morbid affection of the mucous membranes of the nasal cavities will sometimes remain for a considerable time afterwards, in which there will continue, though the animal may be otherwise healthy, to flow a quantity of thick and *apparently* purulent discharge from one or both nostrils. I have seen cases of this kind which have existed one and two years, and in one instance it had lasted three years, but eventually disappeared. Such morbid flux of matter is always the effect of former inflammations from cold, in which, though the original affection has subsided, yet it has left a disposition

in the membrane to secrete inordinately; and as an *increased* and *undue* action, long continued, almost always alters the secretions, so it is not the true mucus of the part that flows, but one *bordering* on pus or matter: nevertheless we shall hereafter shew that it is not *correctly* purulent, and on this difference we shall ground an important distinction. These cases will prove particularly puzzling to the practitioner, and many circumstances will unite to increase his difficulties: little dependence, as one instance, is to be placed on the absence of ulceration, nor on the state of the lymphatic glands of the throat, unless indeed the disease is of long continuance, and then this want of these characteristics will be a considerable criterion: but in the early stages very little so, for glandered matter will flow some time without ulceration being detected even on careful examination; and still less will the presence of tumefied lymphatics ascertain the existence of glanders with certainty; for in some early instances there is none of this present; and again, on the contrary, there is no tumefaction that glanders can produce but what may be equalled by other circumstances: indeed, any thing passing the absorbents, foreign to the usual fluids taken up, may irritate and enlarge these glands; and they may be at all times swelled in six hours by injecting any thing acrid up the nostrils. In confirmed glanders they are, however, very generally not only enlarged, but they prove less moveable in their situation, and are almost fixed to the jaw; whereas, when the flow from the nose is only the effect o a former cold, they do not present much enlargement. With regard to the discharge, there are usually some distinguishing marks, which, if attended to, will prove a tolerably sure guide. The matter itself in glanders is generally tenacious and sticking, like glue; it is likewise almost transparent, and hangs about the nostrils in a peculiar manner; but more particularly it is continually flowing: whereas in that state resulting from cold, there is not a regular discharge, but it comes on now and then, as when the horse coughs, or when he occasionally *clears* himself; at which times a large quantity comes away, and then perhaps no more for some hours after. And though the matter of glanders may flow some weeks even without ulceration, yet in general cases there will occur a more early appearance of chancres, such as we have described. To all these considerations should be added, the general health of the animal; and some dependence may also be placed on the state of the hair, which I have always observed unthrifty and disposed to fall off in confirmed glanders.

When, however, a necessity exists for an *immediate* decision relative to the disease, and the foregoing uncertainties throw great obstacles in the way of a prompt opinion, I have practised the following mode of determining this point, and always with uniform certainty. If the matter issuing from the nose in these deceptive cases, arising from cold, be dropped into water, it soon rises to the surface and swims; but if the matter from a glandered horse is so dropped into water, it invariably sinks. I will not attempt to assert

that this is an unerring criterion; but I have always found it so, and I further believe that this mode of discriminating between the two originated with myself. But when a still more absolute necessity exists for a decision liable to no error, it may yet be gained under every difficulty by the inoculation of a healthy horse of little value with the suspected matter of the diseased one, in the following manner. Prepare a piece of wool, lint, or muslin, not larger than a pea, which steep thoroughly in the matter flowing from the nose; then raise a portion of the skin of the neck of the healthy horse, avoiding as much as possible a flow of blood, and insert within the wound the substance impregnated with the matter, which confine in its situation by means of adhesive plaister. It is of moment, in this operation, that the skin should be superficially raised, for if it penetrates deeply, blood will follow, which may wash away the matter applied: and it is equally important that the cuticle be absolutely penetrated, so that the inserted substance may lay exactly between the cutis and cuticle. It will follow from this experiment, that if the matter is not glanderous, though a little swelling may appear, it will, in three or four days, totally subside: but, on the contrary, if the matter inserted should be glanderous, the wound will tumefy and put on an angry appearance; additional ulceration will succeed, the lymphatics beyond the part will become corded, and the disease will otherwise manifest itself beyond doubt.

The *Treatment of Glanders.*—The philosophers' stone was scarcely sought for more earnestly by the antients, than a *cure* for the glanders by the moderns, by modern veterinarians at least. The great reward it held out has stimulated many practitioners into a wide field of experiment; and, with such a *stimulus*, it is no wonder that the present ingenious Professor of the Veterinary College should have given the subject an ample portion of his study. But neither Mr. Coleman, Mr. White, nor the other experimentalists on this subject, have succeeded. I also formerly tired my brains, my hands, and my pocket, in the pursuit; but I soon relinquished it, and made up my mind to attempt in future the *cure* of the *curable* diseases only, and to leave the curative attempts on the incurable ones to wiser heads than mine. That a cure may, however, be yet discovered for this specific poison there is no reason from analogy to despair; but on the contrary, as before pointed out, much reason to hope: nevertheless one consideration, not usually taken into the account, would probably much lessen the value of such a discovery, which is, that it does not appear to be the glanders, as it affects the head, that destroys the animal; but as it diseases the lungs. Now, when these important organs become once affected in these cases, it is not clear that even the destruction of the glanderous virus would save the animal; on the contrary, there is every reason from analogy to conclude, that the lungs having been once ulcerated, let the cause be what it would, the pulmonary affection alone would run on to a fatal termination. If, therefore, we could even completely destroy the specific poison of glanders in the constitution by any means, it

is yet in the very early stages of the complaint only that we could hope for complete success.

I have, in my own attempts to discover a remedy for it, considered it as a local affection; and, as such, have tried numerous applications to the nose. I have then altered my grounds, and attacked it from within, as a constitutional disease, by almost every active medicament in the Materia Medica. Many others have travelled over the same course, some with more persevering industry, but all with the like success. In *college practice*, I have heard that the parotid duct even has been taken up as the *forlorn hope*. Many external applications seem, for a time, to benefit the complaint, the running even ceases under some plans of treatment; but the internal morbid action goes on, and the discharge eventually returns. Arsenic has been fully tried, sometimes with deceptive promises of benefit. Acrid mercurials have proved even more illusory, for they have stayed the progress of the disease to such a degree as to encourage a strong hope of ultimate success; but the amendment has always proved evanescent: nevertheless, should a cure be discovered, it will probably be one that attacks the disease by means of the system at large. It can be *given* through the medium of the blood, as has been proved by transfusing that of a glandered horse into the veins of an ass, who soon became affected; and it is more than probable it must be by the same medium alone that it will ever admit of a cure when confirmed.

FARCY.

[*Le Farcin.*

From what has preceded on the subject of glanders, it will appear that these two diseases may be considered as modifications only of each other. Though the older writers were aware that one sometimes terminated in the other, yet they still considered them as two distinct affections; and this the more, as farcy was found sometimes curable, but glanders never. To prove that no such inference however ought to have been drawn from this circumstance, we know of several other complaints where one modification is easily removed, and another proves very obstinate, if not totally incurable. La Fosse, who paid so much attention to the subject of glanders, did not, however, extend his inquiries sufficiently to this complaint; but, on the contrary, contented himself with considering it as a disease existing in the blood vessels, and also in the blood itself, sometimes affecting the red, at others the colourless parts. It has likewise continued, till very lately, to be considered as a disease of the blood vessels, not, indeed, of the arteries; but, with us, has long been regarded *as* affecting the *veins*. The awakened attention of more enlightened minds to the subject, has now shewn, beyond a

doubt, that farcy, in its local or early state, is a *specific inflammation of the absorbents of the skin.* As long, likewise, as it remains in this superficial form, it is not very difficult to treat; but when it becomes introduced into the system at large, by means of the circulation, it proves very generally fatal; most certainly so, when it ends, as it usually does, in glanders. This spontaneous and general termination in glanders would alone point out its intimate connexion with that disease; in fact, the general identity of the two. Like glanders, also, it may be either generated or caught, but it is much more frequently generated, I believe, than glanders. In some instances, where it arises spontaneously, it first appears in the form of diffused swellings over various parts of the body; and, at others, it seems to originate from a sore taking on a *peculiar action.* This peculiar action seems itself to generate a poison that becomes absorbed into the habit, and produces its destructive effects either upon the deeper-seated absorbents, or upon the membrane of the nose, and, finally, on the lungs themselves. No part of the body is exempt from its attack; but the head, neck, and extremities, particularly the hinder ones, are most liable. When the virus is absorbed by the lymphatics, it occasions a *specific inflammation;* and in its passage forwards, when it meets with a valve, its progress appears arrested, for the valve swells, becomes hard, and forms a tumour, which is technically called a *farcy bud.* The slow progress of the disease, in many cases, seems to be dependent on this obstruction offered to the passage of the poison by means of the swellings of the lymphatic glands; and it is by catching the poison at these resting places that we are enabled in the early stages more readily to promote the cure. At length, however, if nothing is done, these tumours or buds ulcerate, and discharge a thin sanies; and from one bud or valve it passes on to another, inflaming the lymphatic vessels between as it passes, and giving them a hardened feel like a cord under the skin; and as these vessels run in the course of the veins, so the older farriers were, probably, from thence led to their opinion that the farcy was a disease of the veins, and these enlargements, in their writings, are therefore always described as the *corded veins.* The invariable course of the affection is towards the thoracic duct, as might be expected, seeing it is at these times confined to the absorbents; and in its passage it inflames and enlarges all the superficial lymphatic glands it meets with: from whence follows not only numerous little farcy buds in the skin, but larger and very painful swellings take place of the more considerable absorbent glands of the groin, and of those between the fore legs, and under the jaw. Sometimes these proceed to suppurate, when they form extensive sinuses or *farcy pipes*, and which are found, like most poisoned wounds, very difficult of cure. When the disease is received by infection, there is reason to suppose it is most generally effected by means of the application of the matter from a farcied sore of an infected horse, to some inflamed or abraded surface of a healthy one. I am not aware that the introduction of the matter of farcy

within the stomach will produce the disease; I am disposed to think the contrary: but, in contradiction to glanders, the application of the matter to a simple uninflamed mucous membrane will, I believe, propagate the infection. These points, however, I do not yet think fully established.

From the varieties in the appearance of farcy, it is often not much less difficult to decide on its actual existence than it is on that of glanders; and mistakes between this and other affections are every day made in the practice of farriers. Every diffused swelling, from whatever cause, even ossifications and ligamentary enlargements, are termed *farcy humours;* and the poor animal, from these erroneous conclusions, becomes subjected to a long and painful treatment, unless he more luckily meets a milder fate by being condemned to the hounds. Sometimes one limb, or part of a limb, will remain indurated and enlarged for a considerable time, probably from the cause above assigned, that the virus becomes arrested in its progress from a lymphatic gland enlarging and becoming impervious. This farcied enlargement of a limb is not, to a partial observer, unlike the ligamentary thickening of a gorged leg, neither is it much unlike the swelling from œdema or want of condition. But, independent of the circumstance that the farcied poison will find itself other passages, and proceed upwards, and thus shew itself in its true colours; on a very careful inspection, these swellings, when they arise from farcy, will present an uneven surface; the little glands of the skin will here and there point themselves into small buds; and it is further worthy of remark, that such swellings are more likely to exist in definite masses, and *between* the joints than *on* them or *near* them, which is not the case in ligamentary enlargements arising from over-exertion or strain. Common swellings of the legs, from cracks, grease, or want of condition, may likewise be distinguished from farcy, because they readily disappear on exercise.

Like the venereal poison, the farcy confines its attack to the external parts, and, like that, it shews a preference for some situations more than others, as we have already noticed; nor is it less various in its mode of coming on: one particular kind of it I have not seen noticed, and which is probably a generated one, shews itself by the affected horse becoming suddenly lame in one limb, and then again in another, which parts, when attacked, swell, but recede again. In this way he may remain for months, with his health very slightly affected; at length, however, the disease assumes a more marked character, some of the swellings ulcerate, and glanders eventually closes the scene.

The *Treatment of Farcy.*—In the very early stages of this complaint, when it has been taken from another, or when it commences in the extremities, it appears then, as we before remarked, to confine itself to the lymphatics of the skin, and in this state it is not found difficult of cure: but when it is generated in the habit, and when it has been inoculated, not in the extremities, but in the head,

neck, or by means of mucous membranes, by all which the virus is soon received into the blood, and renders the disease constitutional; it then is less easily treated, though until it has injured the lungs, or degenerated into glanders, the case is not hopeless. Mr. White has considered the farcy as a *local* disease, and the glanders as a *constitutional* one; and though he admits that one poison produces both, yet he conceives there is this essential difference between them. I have already, when treating on glanders, described how far I think this erroneous. When farcy has its origin in inoculation, particularly of a part distant from the heart, as the hind leg, &c., it may be considered in a similar light with the wound made by a rabid dog, which, until it reaches the source of circulation, does not exert its baneful influence; and, therefore, may be destroyed by arresting its progress in its first stage. So far farcy is local; but when it becomes generated in the constitution, it cannot be considered as local, neither does it prove so but a very short time, if any, when inoculated in the head, neck, or any part near the source of circulation. Nevertheless, I am not prepared to say that it is never cured when it has even tainted the constitution; on the contrary, I think there is reason to suppose that it is sometimes eradicated after this, and insomuch it certainly differs from glanders; but when it has propagated its morbid effects to the lungs, it is no longer curable; nor has it ever been eradicated after the nose began to run and the lymphatics of the jaw were affected. In our treatment neither is it ever safe to regard it as purely local, or to trust wholly to external applications for a cure. I formerly thought it might be effectually arrested in the first instance in the absorbents, and that nothing more than the destruction of these was necessary to effect all we wish; nor can it be denied that, sometimes, this has succeeded, but it is more usual in these cases for the disease after some time to reappear, and commonly in a more malignant form. I would therefore recommend to the practitioner always to *treat* it as a constitutional affection, and I then leave it to his own fancy to *call* it what he pleases, either constitutional or local. The cure should be commenced by destroying all the diseased *buds* by caustic or by cautery, and this whether they are ulcerated or not. The quickest mode is to divide them with a sharp firing iron, particularly if they are superficial: if deeper seated, an opening may be made in each with a lancet, and the bud touched effectually with the lapis infernalis (see *Caustics, Materia Medica*). In more advanced stages, when these tumours or buds are extensive, and have burst, a wash may be made of nitric acid diluted with water, to a state that does not give inconvenient pain, and with this the sores may be washed twice a-day. The internal remedies used are various: nearly all the mineral acids have been found useful, and some of the vegetable ones: it indeed seems principally necessary to the destruction of the farcy virus, that some other poison should be admitted into the constitution of greater activity, though with its acrimony sheathed in some degree; and in

such way only can we account for so many of the active agents in the Materia Medica being found useful in farcy. All the different forms of mercury have been tried with considerable success; but the oxymuriate of quicksilver (*corrosive sublimate*) appears the best; and, when determined on, should be given to the full extent the stomach and bowels will bear, without purging or symptoms of inflammation being brought on. Ten or fifteen grains may be began with, ground very finely, and given night and morning in gruel as a drench, or mixed with butter, lard, or any other substance, as a ball. If this occasions no distress, it may be increased to a scruple, and from this to half a dram, if it is borne with ease: but the utmost care and watchfulness should be exerted when the dose is considerable. And when, as is sometimes the case, the weakness and irritability of the horse are too great for the exhibition of the corrosive sublimate, give half a dram of calomel twice a-day, or the blue pill, as it is termed, may be used instead, to the amount of half an ounce night and morning, still carefully watching the salivating process.

After the trial of mercurials, arsenic ought next to claim the attention, as that has also proved very efficacious, and may be given in similar quantities, in the same forms, and with equal caution. At one time it was, I believe, the fashion at the Veterinary College to give verdigris in doses of a scruple, three times a-day, increased to a dram. I have witnessed also good effects from this preparation; but I have found it most efficacious when given in a ball in conjunction with the sulphat of copper (*blue vitriol*), one dram at a dose. Some practitioners chuse to employ all these in conjunction, and they assert the cure is speedier from the combined articles than from any one separately. In this case, give the following:—

Corrosive sublimate (*oxymuriate of quicksilver*) eight grains,
Arsenic (*oxide of arsenic*) . . . . . ditto,
Verdigris (*subacetate of copper*) . . . . . ditto,
Blue vitriol (*sulphat of copper*) . . . . . one scruple.

Make into a ball, and give every morning.

Should the subject be a small, or a weakly one, begin with rather a smaller dose of each of the articles: but in any case, when the quantity is found to sit well on the stomach, increase the dose of each article, daily, one or two grains, carefully watching the effects produced, occasionally resting a day or two; and, however well the ball may seem to agree, do not increase the more active mineral agents beyond fifteen or twenty grains each, without great caution, and the most marked attention to the effects. It has been thought prudent by some to divide the dose, and to give the half, night and morning: but I have not, in general, found any benefit from this plan, for the quantity that the stomach and constitution will bear, will be as well borne at once as at twice; and it may be also remarked, that some horses can take three or four times more than others. Great caution is therefore necessary in proceeding with the

use of the mineral agents, but it is equally necessary that the dose should be increased, in all cases, to as much as the constitution will bear (see *Mercurials and Arsenic in the Materia Medica*); and when evident distress and loss of appetite occur, omit the remedies wholly for two or three days, and then resume them again. During their exhibition it is also absolutely necessary that the constitution should be supported liberally, nor should the stomach and bowels ever be suffered to remain empty for any length of time.

In addition also to the use of the mineral acids, I have experienced much benefit from the following drink, given in conjunction with the ball beforementioned, every day, but not at the same time of the day; the ball in the morning, for instance, and the drink in the evening:—

The expressed juice of the clivers, or goose grass	six ounces,
A very strong decoction of hempseeds . . .	ditto,
A ditto of sassafras	ditto.

Mix.

Green meat should be particularly sought after, and if the bowels will bear it, the horse should be wholly fed on it; but if it gripes, add a quantity of bean meal or split beans to some chaff, and give also. Moist and succulent food appears to do much towards a cure; in one instance, a horse so reduced as not to be able to stand, was drawn into a field of tares and suffered to take his chance; the consequence was, that, when he had eaten all within his reach, he was able to rise and search for more, and eventually recovered. When green meat cannot be got, feed on carrots, or speared corn.

DYSENTERY.

Dysenteria.] [*Grasfondu.*

This disease, the *grasfondu* of the French, and the *molten grease* of our farriers, is, in itself, one of the strongest proofs of the pitiable state in which veterinary medicine has been hitherto plunged. Bartlet, who was educated a surgeon, and should have known better, says, 'by molten-grease is meant a fatty or oily discharge with the 'dung, and arises from a colliquation, or melting down of the fat 'of a horse's body by violent exercise in very hot weather.' Bracken and Gibson had held the same before him, and later writers on this subject have copied their errors*. But the appearance which has

* In a work written on horses so late as 1798, by Mr. John Lawrence, the following absurdity appears:—'Molten grease is a colliquation, or general melting 'of the fat of the body, part of which is absorbed and thrown out on the blood, 'and on the intestines, and voided with the excrements. The horse must be 'much subject to this malady, from his natural propensity to acquire fat in a 'short time.' The author adds, 'I have repeatedly seen that the blood of a 'horse taken up from grass will not only have a greasy pellicle on it, but will cut 'several inches deep in fat: this being of a loose and unsubstantial texture, not like

been mistaken for fat, is nothing more than an increased secretion of the mucus of the intestines, and is as liable to a horse with little fat as to one with much.

Dysentery appears a peculiar inflammation of the inner or villous coat of the intestines, producing an increased secretion of the mucus formed from it, and a frequent discharge of it; and it is from its glairy consistence that it has been mistaken for the fat of the body melted by heat or exercise, and passed off in this way; and, from so considering it, has arisen the gross term of *molten grease*, by which it is called in all the former works on farriery: and as, in this disease, there is always present considerable fever, or increased vascular action in general; so when blood is drawn it exhibits much buff or coagulable lymph; and this has been regarded as a farther proof by the older farriers, that the fat of the body is, at these times, in a state of general solution, and floating loose throughout. Mr. White considers dysentery not as a distinct disease, but as only a symptom of general inflammation: nor is it, in a *general* point of view, of much consequence, whether it is considered as a disease or as a symptom, so it is successfully treated. But in *teaching cause* and *effect*, it is of import that our descriptions and designations should be correct. I cannot therefore but endeavour to impress on the veterinary student's memory, that I think this may most justly be regarded as a *true primary disease*, dependent on the causes, and having the appearances we shall describe. Mr. White has also rather mistaken me, when he observes, that I consider this as similar to the human dysentery. Perhaps I might not have made the distinctions sufficiently obvious between the two, but I expressly state, in the former edition of the *Veterinary Outlines*, that I believe it is never contagious, and its being epidemic is also questionable. I am, however, very ready to own, that after fifteen years' additional experience, I consider it as still less allied to human dysentery than I did formerly; though as it has its origin in an inflammatory affection of the mucous membranes of the intestines, which also is the grand characteristic of the human dysenteria; and as, also, both produce a morbid increase of the mucous secretion, so I know no

' the pinguedo or suet, no wonder it will fuse by great heat and exertion.' What this gentleman mistakes for fat in the blood, is only the inflammatory crust or buff; and is simply the coagulum of the blood, and common to every horse, fat or lean, whose vessels are labouring under increased action.

Since the above note appeared, in the justice of which I am supported by the evidence of every regular and scientific veterinarian; a second edition of Mr. L.'s publication has been brought forward, in which he attempts to explain away the grossness of this reasoning by the subterfuge of attributing it to a casual inadvertence; at the same time, he betrays a pitiful petulance at my discharging my duty as a writer, in fact a public and imperious duty, that of combating error wherever I meet with it. In noticing this gentleman's work, meagre as it is, I did it on the broad scale of legitimate criticism; but, in his second edition, from a paltry revenge, whenever he has mentioned mine, he has done it in envy, without candour, and with a total disregard to the common urbanity that ought to characterise every one who has any value for his own character.

better *systematic* name for it than *dysentery*. In the human subject this disease appears to partake of a putrid tendency, originating frequently from marsh miasmata; it is also highly contagious, and often epidemic. In the horse, on the contrary, though there is reason to consider the inflammation that attacks the inner surfaces of the intestines as rather of a peculiar kind, yet it has no putrid tendency, nor is it dependent on a specific contagion; neither does it produce usually such intense symptoms, nor prove so obstinate in treatment.

It differs in the horse from diarrhœa, in being a primary attack on the mucous membrane of the intestines; or, perhaps, it may be a true translation of the matter of fever to these parts; whereas diarrhœa consists of a simple morbid increase of the peristaltic motion of these organs, and a frequent ejection of the aliments taken, in the form of liquid fæces: while, in diarrhœa, instead of these, there appears a voiding of a matter actually secreted by the bowels themselves. The secretion is a diseased one; but this serves to form a specific difference between these two complaints, inasmuch as this secretion forms the principal matter voided.

From the inflammatory nature of the horse's habit in general, and, perhaps, from some peculiar tendency in these organs to take on a diseased action; we very seldom find him subjected to fever or any violent internal inflammation, in which there is not present a disposition to a separation of the mucus of the intestines; and the dung, in these cases, is frequently surrounded by it. When the febrile action is more increased, the deposit gains more consistence, and is formed of masses of coagulable lymph. It is this peculiar tendency, I suspect, that has made Mr. White naturally enough consider all dysentery as symptomatic, and not primary, seeing it so usually accompanies other inflammatory affections. But though this is commonly the case, it does not destroy the liability in the horse to become subject to it as a primary affection, and which he is found to be, although not frequent, yet sufficiently often to render it worthy of our attention.

The *Symptoms* that characterise dysentery as a *primary* affection, are the frequent voiding of this mucus we have described, with considerable uneasiness from the tenesmus, and constant inclination to stool. The mucus is mixed in general cases with the fæces, which are not, except in very aggravated cases, retained, as in human dysentery. Nevertheless, this mucus forms the principal portion of numerous of the ejections, and this serves to distinguish it from diarrhœa, with which it is very liable to be confounded. If the disease increases in violence, membranous films, like sodden leather, are thrown out, which are productions of the coagulable lymph, and have been mistaken for the inner membrane of the intestines. In very aggravated cases, the vessels eject blood instead of lymph, and now and then the intestines become ulcerated. The pulse is variously affected; as when the inflammation is not intense, it is

quickened, corded, and hard; but when extreme, it is frequent and oppressed. The mouth is always dry, the appetite lost, the flanks heave, and there is usually much thirst.

Causes.—As we have observed, it has very different origins from the human dysentery, being in the horse altogether dependent on an inflammatory habit, acted upon by some immediate excitement; and, as such, it is more usually observed in the young and robust. The proximate causes appear therefore to be dependent, in some instances, on a sudden check to the perspiration; and, in others, on a change of food: acrid substances, as mineral poisons, may occasion it; and, not unfrequently, it is the effect of drastic and improper purgatives. One other cause also remains to be noticed, that is seldom taken into the account, which is *metastasis*, or the translation of the matter of fever to the intestines; and this is, I am disposed to believe, a more frequent cause than is generally imagined.

Cure.—In the first stage of the complaint bleeding should be premised, to the amount of three to five quarts, according to the size and condition of the subject, and the violence of the inflammatory appearances; and should the pulse continue hard, and the other symptoms indicate it, another moderate bleeding may follow the next day. The yellow buffy surface on the blood drawn must not be mistaken for fat; neither must this appearance alone be a stimulus to repeat the bleedings, as it is in this case observed to accompany the complaint frequently through its whole course. It is also necessary to be aware that sometimes, in spite of the apparent inclination to stool, there exists an absolute and obstinate costiveness, the mucus only passing, but the real dung being retained. This is not frequent; but as it does sometimes occur, so the practitioner should always make himself aware that the dung actually does pass. In cases of true fæcal obstruction, back rake, but with great gentleness, as the intestines, particularly the cæcum and rectum, are, in these instances, extremely irritable and tender. Give also a pint of castor oil, or, if the expense of this article is objected to, eight ounces of Epsom salts may be substituted; but they cannot be considered so eligible as the castor oil. At all events the costiveness must be overcome, and a repetition of laxatives must take place till that event occurs. But much more generally the fæces pass freely, and in a purging form, mixed with the mucous secretion; and between times this secretion passes alone, particularly when the complaint is considerable: yet even in these cases, when either cold may be suspected to be the origin of the disease, or the translation of fever to the bowels, or any other cause than superpurgation, the first internal medicine should be the following:—

No. 1.—Castor oil	six ounces,
Powdered ipecacuanha	one dram,
Powdered opium	one scruple,
Liquid arrow root	eight ounces.

After this, should the voiding of the fæcal and mucous matter continue, the following may be then given once or twice a-day. And also, when the disease originates from violent purging medicines, having been imprudently given, in which cases bleeding, unless the inflammatory symptoms are very high, is not so much called for; then no internal remedies but the following are necessary :—

No. 2.—Powdered ipecacuanha	two drams,
Powdered opium	half a dram,
Powdered catechu	two drams,
Prepared chalk	two ounces,
Boiled starch or arrow root	a pint.

Mix and give, horning down at frequent intervals starch, arrow root, or linseed tea. It is likewise most essential that one or the other of these demulcents should be thrown up three or four times a-day as clysters: and in desperate cases the belly may be very properly fomented with a hot decoction of poppy heads, and a new sheep skin, if at hand, may be applied afterwards. Or the mustard poultice (see *Mat. Med.*) is by no means an improper application when the inflammation of the bowels appears considerable. Warm clothing is proper, and a moderate temperature; and when convalescence approaches, every care must be taken to prevent a return of the complaint.

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Dysentery *in* Cattle.

In oxen and cows this is called *scouring*, *scouring cow*, *braxy*, *bloody ray*, and *slimy flux*. Some of these names, particularly the three latter, are peculiar to this complaint; the two former are common to this and to diarrhœa, or common looseness, with which this is very liable to be confounded; and few of the practitioners among cattle are aware of the real distinctions between the two, and hence the same treatment is pursued for the one as the other. The dysentery is characterised by a peculiar discharge from the bowels, of a frothy slimy nature, with much fœtor or bad smell: sometimes it looks red or brown, and sometimes more yellow, with mucous stringy patches in it; and if observed when voided, it is very hot, and smokes. These appearances of the matter discharged should be particularly attended to, as they will serve readily to characterise the disease, and to distinguish it from simple diarrhœa, in which there is nothing more than a liquid discharge of dung, composed of the mere matters taken in by the stomach, in a state of solution. These are not the only distinguishing marks, but they are the most familiar ones; the others may be gained from what follows.

In a *systematic* point of view this disease is essentially different from diarrhœa, which is, as above stated, simply an increased action

of the peristaltic motion of the bowels, whereby they are stimulated to a more frequent evacuation of their contents; whereas dysentery is here also, altogether an inflammatory disease, that falls particularly on the bowels, inflaming their inner surface, and producing a morbid and an increased secretion of their mucus, and of which mucus their stools are principally composed. This complaint in cattle bears a strict resemblance to the molten grease of horses, except that it approaches in the former to somewhat more of a low type. It is common to the fat and high fed, and less frequent in winter than in summer: but over-exercise will bring it on at any time; and perspiration suddenly checked may also produce it.

The *Treatment* is nothing different from what is proper in the same complaint in horses; bleeding moderately, fomenting the bowels, or stimulating them with a sheep's skin or mustard poultice. As an internal medicine, No. 1, page 417, should be given first, and will be found to have a particular good effect on the bowels This may be followed by No. 2 in the same page; and in all other respects treat as there directed. In cases where the above remedies might be considered as too expensive; begin with six ounces of Epsom salts, and one scruple of powdered opium: after which give once or twice a-day a pint of thick starch, in which has been mixed an ounce of prepared chalk.

Sheep are also troubled with a dysenteric affection called *braxy*, in which there is a frequent stooling of soft dung mixed with blood and mucus. When it terminates fatally, these motions become dark and fœtid. If the inner surface of the eye is very red, and the animal strong, take eight ounces of blood away. Give two or three ounces of castor oil, with thirty drops of laudanum; or an ounce of salts with the same quantity of opiate: after which give, night and morning, the following:—

Powdered ipecacuanha	fifteen grains,
Prepared chalk	one dram,
Powdered opium	two grains,
Boiled starch	four ounces.

House the animal, give gruel or starch in case the cud is lost, and the cure will be complete.

Class IV.

Diseases of the Brain and Nerves.

EPILEPSY.

THE *Meagrims, Stardy*, or *Turnsick*, are a species of *Epilepsy*, to which horses are not unfrequently subject; and in which, without previous notice, the animal in mild cases stops short, shakes the head, looks irresolute and wandering: in this state he continues a few minutes, and then proceeds as before. In more violent cases he falls at once to the ground, or first runs round, and then falls senseless. The whole system appears agitated by strong convulsion, he dungs and stales insensibly, is at sometimes violent, and at others more passive, but equally unconscious to every thing around in both. After remaining a longer or shorter period in this way, his faculties return, and he rises. It may be distinguished from gripes by the suddenness of the attack, and by his being insensible to surrounding objects, which is never the case in colic.

A *Cure* may, in general instances, be effected by a course of mercurial alteratives, followed by, or alternated with, purging medicines: after which, turning to grass for three months greatly ensures success.

LOCKED JAW.

Tetanus.] [*Mal de Cerf.*

THE *Stag Evil* of the farriers is one of the most obstinate and fatal diseases that occur, and appears to arise from some cause operating on the nervous system, by which a rigidity or contraction of all or several of the external muscles are occasioned: those of the head, neck, and jaws, are usually first affected, when the farriers term it *jaw-set;* in the human subject this state is called *trismus*. If it proceeds to contract the muscles of the back and extremities, it assumes the name of *tetanus*. As it usually first appears in the external muscles of the throat, a difficulty in swallowing commonly commences the complaint; gradually the jaw becomes closed: and as the muscles generally, become affected, the horse's head is raised, his nose is carried out, his legs straddle wide, and his ears and tail are cocked. The eyes are sometimes turned inward, and, from the contraction of the suspensory muscle, the haw is partly drawn over

each. When the disease is violent, these contractions occasion the most distressing sensations to the horse, and give an air of eagerness to his whole appearance. The pulse is sometimes irregular and quick, but more commonly it is little affected: there is seldom fever, but frequently cold sweats; and the internal functions are not at first materially injured, nor is the appetite impaired.

The older writers on farriery did not understand this disease at all. La Fosse directs attention to be paid to the general diet, and to introduce setons. Bartlet also prescribes a ball twice a-day, when even a drink can seldom be got down.

It appears both idiopathic and symptomatic: in the former case it seems most generally brought on by cold. I once saw it occasioned by rain dripping between the tiles of the stable upon a horse's loins during one stormy cold night: in another instance it was produced by the improper conduct of a servant stopping two hours at a public house, leaving his horse, previously hot, at the door during this time. It may be also occasioned by worms or other internal irritations. When it is symptomatic, it usually arises from some local injury, and that often of the most trifling kind, as treads, corns, pricks in the feet, and wounds of all kinds *. Docking and nicking are very common causes of it: in fact, any lesion of parts may occasion it †. Nor have I observed that it is more liable to arise from injuries done to tendinous than to muscular parts, as is remarked in the human. It has been considered as originating from the partial division of a nerve, or otherwise from a peculiar irritation on a nervous branch of the wounded part: but there appears no reason to consider a partial lesion as the cause, but great propriety in regarding it as the effect of a peculiar irritation on the nerve or nerves of the wounded part; which irritation transmits its morbid affection in a backward direction towards its origin, the brain. The brain again transmits the same throughout all the ramifications dependent on the spinal marrow, particularly on those going to the

* Within these few days I have witnessed a very distressing case of *tetanus* in the horse, from a wound inflicted in the breast by the goring of an ox three weeks before; and which, by the judicious management of my partner, Mr. Youatt, had perfectly healed in that time, although originally ten or twelve inches in length, and of such a depth as to allow the protrusion of the thymus gland. At the moment the wound perfectly closed the complaint began to shew itself; but Mr. Y. was not informed of it until twenty-four hours afterwards: he, however, immediately proceeded to apply cold water over the body, to blister the spine, and to give opium internally; by which means in a few hours a very marked alteration for the better took place; and to such a degree, that there appeared almost a certainty that the animal would have been saved, had not the extreme ignorance and obstinacy of the owner frustrated all the benefit of the treatment.

† I have also seen it brought on by a bruise. A valuable horse slipped upon the pavement and fell, by which the shoulder was evidently bruised, without, however, any breaking of the skin. On the third day after the accident, which appeared very trifling, I was sent for, and found the poor animal universally tetanic: and so violent was the affection, that, in spite of every means used, he died on the third day from the attack.

muscular fibre; and thus the disease appears to be brought on. Dissections of morbid subjects after death have not thrown much light on the complaint. I have seen the brain apparently more vascular than usual; and the veins throughout the body are commonly turgid with blood: but a curious fact has been mentioned by a slaughterer of horses, that he never cut up one who died of locked jaw, without finding the lungs much diseased.

Prognosis.—This is always unfavourable, seeing that not one in twelve of those affected survive. In the human subject, the idiopathic kind has been found much the most manageable: but I have not observed any difference in the horse. It generally wears the animal down, by the excessive irritation, sooner or later; sometimes in three, four, or five days, and it has been protracted to three weeks: its fatal tendency also must of course be greatly increased by the extreme difficulty usually experienced in giving nutriment. But when the jaw is not wholly closed, and an inch or two of space remains, some hope may be entertained.

Treatment.—By far the greater number of instances prove fatal, yet still a sufficient number recover to warrant our utmost endeavours; and the more so, as those who do survive appear evidently to do so from the beneficial effect of the treatment adopted: while, on the contrary, I never heard of an instance of recovery where the horse was left to himself. Very different means have been successfully used; perhaps they might all tend to the same end, although the *modus operandi* to us is not evident. Bleeding to an enormous extent, as to ten, twelve, or fourteen quarts, has relieved the spasmodic affection. Repeated and large doses of camphor and opium have produced good effects. Drenching very largely with strong ale, and throwing it up likewise as clysters, has relieved the pressure of the symptoms. Pressure on the brain has been tried, and seemed to give some relaxation to the contractions. But of all the means employed, that which most certainly acts beneficially is the application of *cold:* perhaps no instance even occurs where the rigidity of the muscles will not give way, at least for a time, to an extensive application of ice. It is probable that cold acts in this instance as a sedative; and in the same way, there is reason to believe, every thing acts that proves beneficial in these cases.

As a *Curative plan* I would recommend the practitioner to proceed as follows. As soon as called in, let the horse be immediately moved from the stable into the open air, and there let him be dashed with cold water for twenty minutes; after which he should be only partially dried, and by no means again moved into the stable, but suffered to remain, if in summer, in the open air; if in winter, he may be placed in a loose open stable, but made as cool as possible. After this first bath, proceed to blister the whole spine, beginning at the back of the head, and omitting the neck, as the cervical vertebræ dip down deep within the substance, but at the withers recommence the blister, and rub it in most actively along the spine to the root of the tail, and, when finished, cover the whole over with some adhe-

sive matter or covering, so that the future ablutions may not affect the rising of the blister. Having done this, proceed to give the following :—

No. 1.—Powdered opium . . . . . two drams,
Camphor . . . . . two drams,
Spirit of hartshorn (*carbonated ammonia*) . one ounce,
Spirit of turpentine . . . . . two ounces,
Strong ale . . . . . a pint.

Mix, and give every two or at least every three hours, by the mouth if possible; but should the jaws be so closed as to render this impracticable, let it be done by the *nose*, which may be effected sufficiently easy; only that in this case it will be prudent to dilute the drink still further with more ale or gruel, to lessen the irritation to the nose: having done which, fill a quart bottle with a long smooth neck, and elevating the head rather beyond a level, so that the liquor may have a slight inclination towards the throat, introduce the neck of the bottle up the nostril, and gradually pour down the liquid. With a little dexterity, medicine and nutriment may be thus given through the whole disease. When all these directions have been followed, throw up the following clyster :—

No. 2.—Boil twenty poppy heads in six quarts of water to a gallon, add Camphor dissolved in spirit, one ounce.

By pressing down the tail, if not too rigid, retain this as long as possible; and when there is a necessity of nourishing the horse by the intestines, as there will be after the first day, boil the above in less water, and add gruel, broth, or tripe liquor.

In three or four hours repeat the cold affusion, the drink, and the clyster; and continue to do the same at regular intervals, if any benefit appears to arise from the treatment. And when the tetanic affection has resulted from a wound, it will be also prudent to examine the wounded surface, and if healed to open it, and to stimulate by means of hot turpentine poured in; or it may be pencilled with a solution of lunar caustic. If the wound has been extensive, and is wholly closed, blister the outer surface; but if it has arisen from a punctured wound, do not hesitate, if closed, again to open it, and proceed actively to stimulate. As the afflicted animal appears to suffer by mechanical irritation more than by diseased functions; so it is peculiarly necessary to support the strength, and endeavour to wear the disease out. Nutriment should, therefore, be most actively introduced into the system by the stomach and bowels too.

Class V.

Diseases of the Alimentary Canal.

SPASMODIC COLIC.

Cholica.] [*Tranchées.*

THE spasmodic or flatulent colic is the disease known to farriers by the name of the *gripes* or *fret;* to some by the term *gullion;* and appears to be a species of *spasm* of some one or more of the intestines, either large or small. It is seldom accompanied with inflammation, unless long continued, improperly treated, or when intussusception takes place; that is, when one intestine gets inverted within another. It is first detected by an appearance of uneasiness; the horse shifts his position, and paws his litter: as it proceeds his hair stares, he has cold sweats, and he lies down and gets suddenly up; not unfrequently he rolls on his back, after which he rises, and seems for a few minutes relieved. He attempts to stale, looks with anxiety towards his flanks, and sometimes strikes his belly with his hind feet. The pulse is usually not much affected; it is now and then, however, a little quickened; at other times it is rather harder than usual, which indicates some inflammatory tendency: there is, likewise, considerable tension of the belly.

It is essentially necessary to distinguish it from inflammation of the bowels, or what is termed *red colic*, which may be readily done by attending to the following circumstances. In gripes there are remissions of pain, during which the horse remains quiet; but in red colic the pain is continual. In gripes, the pulse is seldom much altered; but in red colic, it is very quick and generally small. The extremities are not usually cold in gripes; in red colic they generally are. In gripes, the horse rolls on his back commonly, but he is not apt to do this in red colic. There are seldom any marks of fever with gripes, but always with the other.

Causes.—These may be, perspiration suddenly checked; the drinking of cold water when warm is a very common cause; obstinate costiveness will bring it on, and proves one of the worst causes; improper food may also produce it; and it is frequently occasioned by a quantity of air let loose from some diseased combinations within the stomach and bowels.

Prognosis.—When unaccompanied by inflammation, and without obstinate costiveness, it seldom proves fatal; but when it does destroy, the intestines after death are found irregularly contracted,

with hardened fæces in the distended cavities; sometimes with marks of inflammation and intussusception.

Cure.—When there is any hardness of the pulse, or when the complaint has continued some hours, bleed, and which, in a full conditioned subject, will never be found hurtful; but the practice of bleeding in the mouth is useless. Carefully remove costiveness, to which end back-rake, and throw up plenty of warm water by clyster, as the mechanical pressure of the fluid will tend greatly to overcome the spasmodic contraction. When this is done, give the following draught by the mouth, which will very seldom fail to procure speedy relief:—

No. 1.—Spirit of vitriolic æther	one ounce,
Powdered opium	one dram,
Oil of turpentine, or, if it can be procured, the spirit of turpentine	three ounces,
Mild ale or gruel	a pint.

To a very delicate horse the following may be given instead:—

No. 2.—Spirit of vitriolic æther	one ounce,
Powdered opium	half a dram,
Oil of peppermint	half a dram,
Castor oil	eight ounces.

Mix, with the yolk of two eggs, into an uniform liquid.

The belly may be well fomented with hot water, or the stimulating applications recommended in inflammation of the bowels applied. But rubbing the belly, by means of two assistants, should always be first tried; gently moving the horse about is also prudent, but in red colic this would be hurtful. It must likewise be remembered that where costiveness is present it will be in vain, indeed improper, to attempt the removal of the pain by antispasmodics until the bowels are opened, which must be attempted by the exhibition of active relaxents (see *Mat. Med.*). Spasmodic colic, if neglected, may kill by the irritation it occasions; and it will, if not relieved, most assuredly degenerate into inflammatory colic, and, therefore, should be as speedily relieved as possible. As a domestic remedy, or in cases where other remedies are not at hand, the following has relieved, given as a drink:—

The expressed juice of two or three large onions .	half a pint,
Common gin	ditto,
Common oil	ditto.

Mix.

In case relief is not obtained, the repetition of the internal remedies should not be delayed beyond two hours. La Fosse strongly recommends a curious remedy for flatulent colic; which is, an onion pounded and mixed with a small quantity of savin and pepper; this is to be introduced up the rectum as high as possible, and the horse then moved briskly about: but in this case, if the quantity of pepper was large, inflammation would probably be the consequence.

Flatulent Colic *in* Horned Cattle.

Oxen and cows are subject to this complaint, but which does not differ in symptoms or treatment from that of horses. There is likewise at times a species of colic observed among cattle, arising from *costiveness;* in which cases the hardened fæces accumulate, and the liquid parts make their way through them, or by their side. This is called, among drovers and persons about cattle, *fardal-bound*, and is very dangerous, from the deceitful appearance it puts on, being frequently mistaken for purging. It is evident this can only be cured by brisk purgatives; and if the obstructing mass was within the reach of the arm, back-raking might remove it; but if not, as before said, active *relaxing* remedies must be immediately applied (see *Mat. Med.*). Bleed also, to prevent inflammation.

CHRONIC INDIGESTION.

Dyspepsia.]

Horses are subject to a loss of appetite, from some morbid change in the stomach, or some disease in its secretions. In these cases the skin sympathises, the hair stares, and the horse becomes hide-bound: he eats without appetite, and what is taken in is frequently passed away nearly in the state it was eaten.

Causes.—It arises, in spring and autumn, from the sympathetic effect the stomach and skin have with each other, at which times a grand change is going forward in the constitution, to enable it to bear the vicissitudes of heat and cold, by the changing of the hair to a more appropriate kind. It is sometimes occasioned by worms. Improper food, bad water, too great heat in the stable, may any of them likewise produce it. Substances given to make a horse shed his old coat, as *grains of Paradise, diapente*, &c., have been a cause sometimes.

Cure.—Its removal must, in a great measure, depend on becoming acquainted with its cause. In spring and autumn feed more liberally, and encourage a determination to the skin; by which means the secretion of the new hair will be accelerated. When originating from worms, treat as under that head. If it should appear to arise from want of tone in the stomach itself, aloes, in combination with the warm bitters, will produce a determination of blood to the digestive organ. The proper remedies for these cases are detailed, and the treatment enlarged upon, under the articles *Stomachics* in the *Materia Medica*, and also under the article *Condition*, page 57.

ACUTE INDIGESTION.

Horses will, now and then, distend their stomach beyond its powers of contraction, in which case the distention produces symptoms not unlike staggers, and which has occasioned the complaint produced to be called *stomach staggers:* but from what has appeared on the subject of specific inflammation of this organ, it may be seen that many of the cases attributed to such distention are dependent on other causes. Nevertheless, there is no reason to doubt, but that after horses have been placed in such situations as to be long deprived of nutriment, when they do find it, they will often eat so voraciously, particularly of dry food, as bran, beans, or corn, as to distend the stomach beyond its capacity of contraction.

Horses, oxen, and sheep, are all liable to it; but it produces very different effects in the one from the other, and requires a very different treatment. In horses it is less frequently met with, but is very usually fatal in them; hence it should be carefully prevented. In treating of digestion, we explained the reasons which nature seemed to have in view in giving a horse so small a stomach; and we have shewn, that as he necessarily passes his food *quickly* through so small a cavity, this disease can seldom take place under any of the circumstances that occur in a state of nature; nor will, it is probable, any quantity of food occasion it, unless a horse has previously fasted long, which is to him particularly hurtful: and as nature did not intend that he should be subjected to long deprivation from food; so she has not provided against the ill effects resulting from over-gorging himself, by giving him the power of vomiting: consequently, when stomach distention does occur, it is more destructive to him, for his resources are fewer.

In oxen and sheep it is different; both their habits and structure are such as to render them more open to this complaint; for, without any previous fasting, they, by eating inordinately of succulent vegetables, may produce it; for as there is a necessity for them to regurgitate and remasticate, so the food they first take in is not passed onwards, but accumulates; add to which, that as it is to undergo a second mastication, so they take it in more quickly. It might be expected that this disease should be attended with more acute symptoms in horses than in cows; for in the latter it is only the recipient stomach, or paunch, that suffers distention, and this is by no means so vascular or sensible as the digestive stomach, which is the organ that is affected in the horse. Therefore, when this disease proves fatal to cattle, it is very frequently by suffocation; but in horses the simple irritation will kill, by its effects on the sensorium. It happens to this animal but seldom, perhaps never, without previous fasting, which weakens his stomach proportionally more than that of other quadrupeds; for his powers are great, his exertions excessive, and his wants are numerous: yet as an animal of speed,

he has, as before observed, a necessity for a small stomach, through which the food may be quickly passed to renovate the frame, and, therefore, he must also be frequently fed. In all animals the stomach sympathises so much with the wants of the system, that it becomes painful when food has been long withheld; and for the above reasons this exists in a double degree in the horse, in whom, when such deprivation is continued, the whole system falls into debility, and the secretion of the gastric juice becomes vitiated. When a horse, therefore, after long fasting is at once presented with a large quantity of food, he eats voraciously, hardly allowing himself time to masticate it; consequently a sufficient quantity of saliva is not separated to moisten the mass, and his stomach itself must be, for the above reasons, doubly incapacitated to the reception of such a quantity, the gastric mucus being vitiated, and the organ weak.

Symptoms.—A horse with *acute indigestion* gradually expresses uneasiness, leaves off eating, holds out his head, looks at his sides, stamps with his feet, and has cold sweats; which symptoms increase till at length he appears completely mad. This arises simply from the distention of the stomach, which occasions a sympathetic effect on the brain, the appearances of which so nearly resemble staggers, as to be with difficulty distinguished from it but by the quickness of its progress; and in this state it usually continues till the animal dies, which is seldom more than a few hours from the attack. An ingenious farrier in Sussex informed me, he had met with two cases lately of acute indigestion from eating grains: in one, the stomach burst; in the other, the horse threw up a vast quantity, and recovered: the latter is a very solitary and unusual instance.

Treatment.—This disease, in most cases, has proved fatal. We cannot puncture the stomach in the horse as in cattle, nor will the introduction of any instrument relieve the distention, seeing it is massive, and not gaseous. The only hope we can, therefore, indulge is, that by stimulating the stomach, perhaps, a better secretion may be obtained, and the contractile powers, in some measure, restored by the stimulus. Ardent spirits may be given in large quantities, as half a pint of brandy, or more; gin, rum, &c., or the following:—

Spirit of hartshorn (*carbonated ammonia*) .	two ounces,
Oil of turpentine	six ounces,
Olive oil	half a pint.

Mix, and give every two hours.

Purgatives are too slow in their effects to be beneficial: bleeding may be tried, but it can do little good; for though it may unload the vessels of the head and of the brain, yet these are but *symptomatic*, and it will add to the weakness of the stomach, which is *primary*; but raking should by all means be made use of, and a clyster of gin and strong peppermint water may be thrown up.

The Hove, *or* Blown, *in* Cows, Oxen, *or* Sheep,

Is a more frequent complaint, but is more easily treated, and less fatal; nevertheless it has been the death of thousands, and is sufficiently terrible in its effects to render all our exertions necessary; and, from the frequency with which it occurs, it has become a subject of investigation with almost every rational grazier, and a particular matter of inquiry with every agricultural body; from whence it is now very successfully treated by the usual attendants on cattle when skilful; but when otherwise, it usually proves fatal. It is observed to be more frequent in warm weather, and when the grass is wet.

When either oxen, cows, or sheep, meet with any food they are particularly fond of, or of which they have been long deprived, as potatoes, turnips, the different grasses, particularly red clover; they eat greedily, and forget to lay down to ruminate, by which means the first stomach, or paunch, becomes so distended as to be incapable of expelling its contents. From this, fermentation begins to take place, and a large quantity of air is let loose, which still adds to the distention, till the stomach either bursts, or, by its pressure on the diaphragm, the animal is suffocated.

The *Symptoms* are sufficiently known by the uneasiness and distress, and the general swelling of the abdomen; with the circumstances of the beast being found with such food, or the presumption that it has met with it.

Treatment.—There are three modes of relieving the complaint, which may be adverted to according to the degree of distention, and length of time it has existed. These are *internal medicines*; the introduction of a *probang* of some kind into the *paunch* by the throat; and the *puncturing* it by the sides. Dr. Whyatt, of Edinburgh, is said to have cured eighteen out of twenty hoved cows, by giving a pint of *gin* to each. *Oil*, by condensing the air, has been successfully tried. Any other substance also, that has a strong power of absorbing air, may be advantageously given. Common *salt* and water, made strongly saline, is a usual country remedy.—New *milk*, with a proportion of *tar* equal to one-sixth of the milk, is highly spoken of.—A strong solution of *prepared ammonia* in water, often brings off a great quantity of air, and relieves the animal. Any of these internal remedies may be made use of when the hoving has recently taken place, and is not in a violent degree. But when otherwise, the introduction of an instrument is proper, and is now very generally resorted to. The one principally in use is a species of probang, invented by Dr. Monro, of Edinburgh, and which is particularly described in the *list of veterinary instruments* at the end. Another, consisting of a cane of six feet in length, and of considerable diameter, having a bulbous knob of wood, has been invented by a Mr. Eager, which is a more simple machine, but hardly so efficacious. It is probable that, in cases of emergency, even the larger end of a common cart whip, dexterously used, might answer

the end. The introduction of any of these instruments may be effected by the help of an assistant, who should hold the horn of the animal by one hand, and the dividing cartilage of the nose with the other, while the operator himself, taking the tongue in his left hand, employs his right in skilfully and carefully introducing the instrument; the assistant bringing the head and neck into such an attitude as to make the passage nearly straight, which will greatly facilitate the operation. By these means the probang may be readily introduced, which is known by a large quantity of air immediately rushing out.

But when no instruments can be procured; or as cases may occur when indeed it is not advisable to try them, as when the disease has existed a considerable time, or the animal has become outrageous, or the stomach so much distended with air, that there is danger of immediate suffocation or bursting; in these instances the puncture of the maw must be instantly performed, which is called *paunching*. This may be done with the greatest ease, midway between the ilium, or haunch-bone, and the last rib on the left side, to which the paunch inclines: a sharp penknife is frequently used; and persons in veterinary practice should always keep a long trochar, which will be found much the most efficacious, and by far the most safe, as it permits the air escaping certainly and quickly, at the same time that it prevents its entrance into the cavity of the abdomen, which would occasion an equal distention. As soon as the air is perfectly evacuated, and the paunch resumes its office, the trochar may be removed; and, in whatever way it is done, the wound should be carefully closed with sticking plaister or other adhesive matter. It is necessary to observe, that this operation is so safe, that, whenever a medical assistant cannot be obtained, no person should hesitate a moment about doing it himself.

After relief has been afforded by means of either the probang or the paunching, a stimulant drink may yet be very properly given, such as half a pint of common *gin*, or one ounce of spirit of *harts-horn* in a pint of ale, or two ounces of spirit of *turpentine* in ale, may any of them be used as an assistant stimulus. When also the cud is again chewed, still some relaxation of the digestive organs may remain; at first, therefore, feed sparingly, and as a stomachic give, for a few mornings, the following:—

Powdered camomile	half an ounce,
Powdered oak or willow bark	ditto,
White vitriol (*sulphate of zinc*)	one dram,
Warm ale	one pint.

The *hove*, or *blown*, in *sheep*, is to be treated exactly in a similar manner; and a smaller instrument for introduction to their stomach, as invented by Dr. Monro, is sold in an improved form by Mr. Long. (*See Instruments at the end.*)

WORMS.

EVERY part of animated existence appears subservient to the purposes of other parts. The predacious tribes prey on each other, and we again prey upon them: in return, whether living or dead, we become food for various living beings of different kinds. Quadrupeds are likewise equally subservient to this great end, and equally support numerous lesser animals. The most remarkable of these, and which fall more immediately under the notice of the veterinarian, are the *worm tribe*. Some kinds of these appear indifferent in their choice, living equally well in all brutes, and hence the parent fly deposits her ova, without discrimination, on any one of these she meets with. But usually there is a choice in this respect, and the body of one animal becomes the proper receptacle for the erucæ of one kind; and a second the proper medium for those of another. A particular species of worm inhabits the liver of rats: in a letter to Dr. Rush, it is said, that out of eighteen of these animals, in sixteen they were present; I have likewise found a kind something similar in mice. The bot is seldom met with but in the horse, and the fluke worm is almost confined to the biliary ducts of the sheep. The existence of these animals was very early known, and in every age the utmost dread has been entertained of the mischiefs they were supposed to occasion; but we do not now suppose them so injurious as they were formerly imagined.

There are several kinds of what are called worms that prove troublesome to quadrupeds, among which the genus *œstrus* makes a distinguished figure. These are the *œstrus equi*, and *œstrus hemorrhoidalis*, whose eggs produce two kinds of bots, very much like each other, inhabiting the stomach of the horse. The *œstrus bovis*, which punctures the skin of the back of cows and calves, depositing its eggs between the skin and flesh. The *œstrus ovis*, which deposits its eggs probably a little within the nostrils of sheep; the *larvæ* of which make their way into the frontal and maxillary sinuses. There is another, which Linnæus calls the *œstrus nasalis*, and country persons name it the nose fly. Mr. Clark calls it *veterinus*, objecting to the term nasalis, as it is unlikely that it ever enters the nostrils. This is found very troublesome to horses and beasts of burden in summer, flying about their noses, and rendering them very impatient. Linnæus supposed they entered the nostrils, and deposited their eggs in the fauces *; but though this is not now supposed probable, yet the true situation of their larvæ is not known. We shall describe first the worms of horses.

Œstrus equi.—This formed the œstrus bovis of Linnæus, who considered the fly that punctured the backs of horned cattle, as the

* Habitat in equorum fauce, per nares intrans.—*Linn. Syst Nat.* 2, p. 960.

same with that which produced the bot of the horse's stomach; and other naturalists fell into a similar error: but Mr. Clark has demonstrated that these are by no means alike, but the bovis is confined to kine, and the equi produces one of the species of stomach bots; for it is to be remembered, that there are two kinds found in the stomach of horses, very similar to each other, but one rather smaller and lighter in colour. The larva of the œstrus equi is the larger of these bots. The larger, therefore, of the two kinds of bots found in the horse, are the larvæ of the œstrus equi, which are very common to horses; those who have grazed being seldom without them, existing often in great numbers attached to the inner surface of the stomach, either to the cuticular or sensible portion, though infinitely more frequent to the cuticular, which renders them nearly innocuous. They attach themselves by two tentacula or hooks situated at their smaller end, and which hooks are so inserted into the substance they hang by, as to require no farther exertion of the animal to keep themselves firm in their situation: from this it is that when dead, and formed into a *preparation*, they are seen adhering as firmly as ever for years afterwards. Their body is a long oval, of a reddish colour, furnished with eleven or twelve circles surrounded with strong hairy processes pointed towards the truncated extremity or large end. Naturalists have differed about the situation of their mouth, but La Fosse and Mr. Clark both describe it as situated between the tentacula, and that by this they receive their nutriment, which appears to be the chyle; and, therefore, when they are extremely numerous, they may deprive the animal of too much of this necessary fluid, and by this means give the unthrifty appearance observed when horses have worms. But there is reason to suspect that the ill effects resulting from worms are not brought on by *bots*, but by the *teretes*: and though the indentations remarked in the cuticular portions of the stomach have led to a fear that they sometimes penetrated through, there is reason to believe this is totally without foundation. Nevertheless, I cannot suppose with Mr. Clark, that they perform any salutary purpose in the constitution. As these animals live on pure chyle, it is probable, but little is necessary to their support; and this may be a reason why no medicine taken into the stomach, however active, has been found to affect them. It has been supposed, no animal could live in the situation they occupy, but this has arisen from a want of sufficient knowledge of the animal economy, and from considering this organ too mechanically; for it is now known, that they not only exist in the stomach, but that it is the situation the parent fly intended they should occupy; but how they get there is a question that has puzzled the curious. M. Vallisneri described these erucæ, or caterpillars, as being produced from the eggs of a fly similar to the humble bee, which was particularly watchful and active about the anus of horses, within which it insinuated itself and deposited its eggs. Dr. Gaspari asserted the same, and from them Linnæus is supposed to have formed this opinion, '*mirè per anum intrans.*'

But naturalists of the present day regard this as erroneous; and besides the obstacles that naturally arise to such an opinion as the difficulty of the entrance, the high temperature of the situation, and the deprivation of air; it has been satisfactorily shewn that the parent fly takes a very different mode of depositing her eggs, which she does not do within the rectum, but upon the hairs of the skin of the shoulders, legs, and on most parts within the reach of the horse's mouth: for the instinct or reason of the animal is such as to make her choose such situations only, as the horse by reaching and licking may carry the young worm into his mouth, from whence it is conveyed into the stomach. The fly, to deposit her ova, is seen to hold her body upright, and, preparing an egg covered with a glutinous liquor, she rests for a moment on a hair, and deposits it; when she rises and prepares another, till some hundreds are so deposited. These are said not to be carried into the stomach till they become worms, which takes place in a few days.

Œstrus hemorrhoidalis.—These produce a species of bots like the former, but rather smaller and whiter; their situation, manners, and habits, are however nearly the same, except that the parent fly deposits her eggs on the lips instead of the legs and shoulders. Both these kinds, when they have remained some time in the stomach, make their way into the intestines, and are passed out by the rectum, remaining in this state a few days, when each becomes a *chrysalis* previous to its final change into a parent fly. These insects probably do much less mischief than has been supposed; it has even been conjectured that, by their stimulating effect on the stomach, they might draw a larger quantity of blood to it, and hence increase the quantity of gastric juice; but when they exist in great numbers they may, as before hinted, deprive the horse of a considerable portion of nutriment, and thus prove pernicious; add to which, that, in their passage from the stomach to the intestines, and through them, they, perhaps, now and then irritate those passages; but, by no means, do they often produce those fatal colics that are attributed to them. Bots are remarkably tenacious of life, and it is to a want of knowledge of comparative anatomy in general, and of the economy of these animals in particular, that so many vermifuges have been recommended against them. Oil smeared on flies kills them, hence oil has been prescribed for these worms; but, though they receive air by means of spiracula, yet its effects are felt in such a way, that oil cannot destroy its influence. I have kept them for some days alive in common oil, and even in oil of turpentine, and many of the essential oils; even vitriolic or nitrous acids do not kill them immediately. It is evident that bitters cannot kill them, for they meet with the most acrid one in the intestines. If they are observed to do mischief in their passage from the stomach to the intestines, then an active purge may hasten their expulsion.

The *teretes.*—These are the long round worms, and resemble the common earthworm in appearance; but are usually more white,

about eight or nine inches long, and most frequent in the small intestines. They are by no means so common as bots, but are much more prejudicial, sometimes occasioning colic and a defective digestion. They are not so tenacious of life as the former, nevertheless are sufficiently so to resist most of the common means in use for their removal. It appears that they propagate and are generated within the intestines.

The *ascarides* are now and then found in the large intestines of horses, though it is not frequent: they may prove troublesome, but are never fatal.

The *general Symptoms of Worms.*—The existence of bots is detected by their appearance, sticking out at the anus: when this is the case they should be removed by the hand; one of them so remaining there will tease and irritate a horse very considerably. When a horse is troubled with the *teretes*, he has a disposition to rub his tail, and a yellow matter appears without the anus; and if they affect his health, he eats heartily and yet does not thrive; the skin sympathises with the stomach and intestines, and hence the coat stares and feels, as grooms express it, unthrifty, and there are frequent attacks of slight gripes: the horse stands with his legs wide apart and his belly low. The breath is often hot and fœtid, and it is not unusual for there to be a short dry cough.

Treatment of Worms.—To attempt the destruction of bots is perhaps useless; common salt is however said sometimes to do it: other worms, though sufficiently tenacious of life, are certainly more easily destroyed. It has been attempted to effect their removal mechanically, by dissolving the mucus they are supposed to be embodied in, for which lime water has been used, injected by clyster up the rectum; strong purges are still more commonly given with the same intent. Remedies have likewise been recommended to kill them in the body, after which they will of necessity pass away with the dung. La Fosse speaks highly of soot; powdered savin has been found useful. In the *human*, the cevadilla, or Indian caustic barley, has been successfully tried on the Continent; and, in one instance, a *man* was cured of worms by accidentally taking two tea spoonfuls of oil of turpentine. The following will be found a useful vermifuge remedy in all cases:—

Powdered arsenic	eight grains,
Pewter, or tin, finely scraped	one ounce,
Venice turpentine	half an ounce.

Mix into a ball, and give every morning fasting for a fortnight, unless it should prove too diuretic.

The Fluke Worm *in* Sheep.

This worm is said to be found in horses and asses. In rats it is sometimes also found; but in sheep, goats, and deer, it is very common, and is supposed to occasion fatal dropsies, and disease

of all the abdominal viscera, and the effects are thence called the *rot*. But these worms are, by no means, so hurtful as supposed, neither are they, perhaps, the primary cause of the rot, nor occasion active injury but when they exist in such numbers as to plug up the biliary ducts; in which case they may produce disease of this viscus and a dropsy of a peculiar kind; or they may kill, by depriving the animal of its biliary purge; for in these cases there is usually much costiveness. They are most frequent in moist situations; but sheep feeding in salt marshes, let it be ever so wet, are not found to have them. That a certain application of moisture is the cause, is so certain, that Mr. Bakewell, when his sheep were past service, used purposely to rot them, that they might not pass into other hands; and this he did by overflowing his pastures, when the sheep fed on them were sure to be rotted in the following autumn. *Salt* seems not only a preventive, but it is a cure in some instances; and it appears, that this is the principal ingredient of efficacy in Mr. Flesh's patent restorative for rot in sheep. The patent states, that it consists of turpentine, sal ammoniac, turmeric, quicksilver, brimstone, *salt*, opium, alkanet root, bark, antimony, camphor, and distilled water. But it is more than probable, that this strange jumble of articles can only be useful from the salt it contains.

Hydatids or Staggers in Sheep.

The Welsh expressively call this complaint *pendro*, and it is but lately that the swelling or vesicle observed has been known to belong to an animal substance, so simple in structure, that persons seeing them have been led to suppose them only membranous bags belonging to the part, or the mere effect of disease: but they are now well known to be hydatid animals. They occupy all the natural cavities of the body; but those we particularise here, are situated within some one of the ventricles, or in or upon the substance of the brain in sheep; and, by their pressure alone, they produce vertigo, or a disposition to turn round to one particular side.

From the previous mischief they have occasioned, their removal is not always attended with the benefit which might be expected; but when early and skilfully taken out by means of the trepan, the animal is sometimes cured.

Œstrus Ovis, or the Frontal Worms of Sheep.

Sheep are observed, in summer, to gather together in clusters, carefully guarding their head, which is to avoid the attack of this insect, who attempts to lay its eggs on the inner margin of the nose; which, having effected, these eggs become larvæ, and creep up into the frontal and maxillary sinuses. The continental shepherds trepan their sheep, and remove them; but our shepherds have not been successful with this method.

Œstrus Bovis, producing Puckeridge in Cattle.

A dipterous insect, which country persons call *wornulls*, or *wormuls*, settles on the backs of oxen, cows, and calves, and punctures the skin, depositing its eggs therein between it and the cellular membrane: these eggs become larvæ or maggots, which, by the irritation they occasion, produce the formation of pus or matter, on which they feed. This complaint is called *puckeridge*, and is erroneously attributed to a wound inflicted by the goatsucker, or evejar. When arrived at their full size, they make their way out at the external opening, and fall on the ground. From the mischief which they do to the hides, their destruction should be attempted, which may be effected by introducing a hot wire; or, by pressing the part; or, injecting it with a little stimulating fluid, as oil of turpentine, &c.

COSTIVENESS.

Some horses are habitually costive, which arises either from a defective secretion of the fluid of the bowels; or, that the absorbents act too strongly, and take up too much of the liquid contents, by which the fæcal mass becomes dry, hard, and difficult to pass; or it may, and frequently does, arise from a defect in the formation of the bile, either as to quantity or quality. This we know from what occurs in jaundice, in which, from a loss of the bile, there is always present a strong disposition to a costive habit. Some food is prone to occasion constipation, as whatever is stimulant and heating. Corn of all kinds, therefore, has this tendency, but beans more than all. *Habitual costiveness* should not be counteracted by purgatives, as they generally increase the evil; but attention should be paid to the habit, and the peculiar tendencies of that should be counteracted. Dry food should be remedied by occasional bran mashes, and the same should be done when the disposition is occasioned by a natural heat in the temperament of the body. Green meat is particularly useful in these cases in summer, and carrots in winter. When costiveness arises from defective bile, treat as directed under jaundice.

Occasional or *accidental costiveness* must be treated differently. First, back-rake, next throw up a laxative clyster (see *Clysters, Mat. Med.*); and then proceed to give a purgative by the mouth, milder or stronger according to circumstances (see *Purges* and *Laxatives, Mat. Med.*).

DIARRHŒA, OR LOOSENESS.

Diarrhœa.] [*Cours de Ventre.*

This complaint is properly an increased action of the peristaltic motion of the intestines, with a greater secretion of a watery fluid within the intestines; or, otherwise, a want of a proper absorption of the fluid part of the intestinal contents; whereby there follows a frequent evacuation of the dung in a very liquid form. It is distinguished from dysentery by the purging being complete from the very first; by its being more copious, having all the fæces in solution without a glairy mucous matter, erroneously considered as the fat of the body; and, also, by being seldom accompanied with fever, or any great affection of the general health, unless it is long continued. Some horses are very liable to purging on every exertion, and such are termed, by grooms, *washy*, having usually narrow chests and lank bellies, by which the intestines have not sufficient room for their natural processes, but are pressed on, and thus forced to a hasty expulsion of the unassimilated contents.

Causes.—It may arise from mechanical pressure, as the form of the body; or from a constitutional debility in the intestines themselves, dependent on the causes abovementioned. A weakened state of the bowels, inclining to this affection, is often brought on by drastic purges likewise. These may be all considered as *constitutional* causes, and such as are liable to a frequent recurrence; but beside these, there arises a more active and serious affection dependent on some morbid change taking place in the secretions of the stomach and bowels, whereby those secretions become a source of irritation to the organs themselves. The *bile* very commonly takes on such a change, and there is reason to believe that this is a fruitful source of diarrhœa. The food itself becomes, at times, improperly assimilated, and enters into new combinations with the gastric juice, whereby an acrid matter is formed: this matter has been supposed to be an acid, and hence absorbent earths have been much used in this complaint. Horses moving from hay to grass, or even from grass to hay, become affected with looseness; for the stomach and bowels prove unequal to the office of assimilating a new food at once, and hence they are irritated to an early expulsion of their contents, as a matter foreign and useless.

It may be symptomatic, or the effect of some other complaint, in which case it ought not to be too suddenly checked. It is frequently occasioned by the sudden application of cold, whereby the exhalent arteries of the skin becoming checked, more fluid is necessarily thrown on the intestines; and which operates not only by increasing their quantity, but likewise by the addition of something foreign, and hence irritating to them. In such case, the restoration of the healthy action of the skin is necessary to a cure; and as the balance of power *has* been in favour of the intestines, it would be

desirable *now* to turn it in favour of the skin, by using the few sudorifics we know of, as *sp. Mind.*, *warm clothing*, &c. &c.; and hence it is possible, that very active astringents may prove sometimes hurtful in such cases (unless we can fortunately at the same time promote a determination to the skin). It may, however, be remarked, that horses are not much subject to symptomatic purging, or looseness, and therefore there is less danger of checking such affections in them than in the human subject.

Prognosis.—It is seldom dangerous, unless very violent, or long continued; or unless, by improper treatment, it should inflame the inner surface of the intestines, and thereby degenerate into dysentery.

The *Treatment.*—It is so very seldom, as before observed, that this complaint is *critical* or purely *symptomatic*, that it but rarely requires apperients to commence the cure with; but mild astringents may in general be at once proceeded on. The longer the complaint continues, the farther it proceeds along the alimentary track, so that, at the last, the cæcum and rectum become principally affected, and then a distressing tenesmus prevails. This circumstance is not sufficiently attended to in the cure of diarrhœa, for in these cases it will be often in vain to give astringents by the mouth, which become so changed in the long alimentary track, as to reach these latter bowels almost inert; but, in such instances, astringent injections will frequently effect all we wish. Commence, however, the cure of the general cases of diarrhœa by giving the following drink once or twice a-day, according to the violence of the complaint:—

No. 1.—Powdered opium . . . . . half a dram,
Powdered catechu . . . . . two drams,
Prepared chalk . . . . . two ounces,
Starch, boiled thin . . . . . a pint.

Mix.

In very obstinate looseness, half a dram of *alum* may be added, and the quantity of opium doubled; and in such case, and also whenever the affection has been long continued, once or twice a-day give the following clyster:—

Boil six poppy heads in four quarts of water to two, add to the liquor
Prepared chalk . . . . . two ounces,
Boiled starch . . . . . two quarts.

Mix.

To this also, if necessary, alum may be added; and should the horse be weak, boiled starch, or arrow root, or boiled bean meal, may be horned down the throat frequently. Give no cold water to drink, but, instead, give thin gruel or rice water, chilled. Clothe warmly, encourage a warm temperature also, and carefully avoid exposure to sudden currents of cold air. To the more intimately understanding of this complaint, under its several varieties, see the subject of Dysentery.

Diarrhœa *in* Cattle.

Cattle Looseness, Scouring Cow, Scantering, Scouring Rot, are, all of them, terms used by cowleeches and persons about oxen and cows, to express diarrhœa, or alvine flux, which is much more frequent in kine than horses, and also more obstinate and fatal. To a proper treatment of this complaint it is necessary to consider it in a different point of view to what it has been generally regarded. There are, in fact, *three kinds of scouring* in cattle. A *dysenteric,* already considered; having an inflammatory origin. An *acute* diarrhœa; and, a *chronic* diarrhœa: and it is from generally blending the acute and chronic into one point, that the disease has so long remained misunderstood, and the means adopted for its *cure* so various and absurd: for among the remedies employed by persons about cattle, are, hog's dung, turpentine, and buttermilk. Dock rook boiled in salt and water; and nettle root, in forge water; are also in use: as likewise red sanders and milk, and sulphur and diapente; while some cowleeches simplify their treatment still more, and give only salt and spring water.

Acute Diarrhœa.—By this I would distinguish that kind which comes on suddenly, and with a known and apparent cause; such as overheating by exercise; drinking cold water when hot; a sudden change of food, &c.; all which cases may, in general, be easily and successfully treated. The *appearances* are, a listlessness and shifting about, with a very frequent fæcal discharge, in which the hay, grass, or other matters eaten, often appear half digested only. Sometimes the stools are slimy and frothy, but, in the *acute* kind, they are seldom dark coloured, except the liver is inflamed. As soon as the complaint is discovered, if the subject is at grass, immediately move into a shed, and feed on hay; and should the appetite be much affected, try the oil cake, or whatever will please; but, if wholly lost, drench frequently with bean flour or oatmeal gruel, as it is of more consequence than is generally supposed to support the strength immediately. The following drench may be given, night and morning:—

No. 1.—Powdered alum	half a dram,
Prepared chalk	two ounces,
Starch, boiled moderately thick	a pint.

Mix.

Should this prove insufficient to check the purging, add to each drink the following:—

Powdered opium	half a dram,
Powdered ipecacuanha	two drams,
Powdered catechu	ditto.

And, in very desperate cases, throw up also an astringent clyster (see *Materia Medica*), and clothe the body, or foment the belly with a decoction of poppy heads.

Chronic Diarrhœa.—This is considerably different from the former in origin, appearance, and in the obstinacy that usually characterises it. It may arise from any thing tending to reduce the animal beyond a certain limit. Oxen who have been driven long distances, if fat, become affected with dysentery; but, if they are lean, and low in condition, they take on the scouring rot. Cows, suffered to suckle two calves, or not sufficiently fed when long milked, are liable to it; and now and then it follows exposure to bad weather, particularly in impoverished animals. Bad food is also a common cause of it. The symptoms of this more slow continued kind are, a frequent stooling of liquid matter: the appetite is seldom much impaired at first; sometimes, on the contrary, it is increased. The evacuations are much darker and more fœtid than in the former kind, and, as they drop away, a lighter yellow fluid follows, leaving a frothy head to the fæcal mass. The animal loses flesh, the eyes look yellow and are sunk, and the graziers affect to tell the existence of the complaint by the tenderness of the animal across the loins, but which does not always exist; and much oftener I have found the beast tender in the belly towards the right side. I have had opportunities of observing the morbid appearances of several of these cases after death, and in every one of them there were great marks of visceral affection: in some, the mesentery was enlarged; in others, the kidnies have been injured; in a very few, have the intestines themselves exhibited appearances of primary affection; but, in every one, a diseased liver has been a marked characteristic; and, I believe, to this origin may be ascribed almost every one of these cases, and to which source we are also to look for the obstinacy and fatality of the complaint. In some, the liver has been indurated and lessened; in others, it has been indurated and enlarged; while, again, a third may have this gland much enlarged, but much softer than natural, and, when cut into, having cells filled with pus or matter.

The *Treatment* of this kind of scantering, or rot, does not always succeed, however judicious; the immediate looseness is the least part of the complaint, for it only arises from a diseased bilious secretion, which proves a continual irritation to the bowels. However, the cure may be began by attempting to check its violence by the drink No. 1, before prescribed. But when the flux is a little checked, or in case that remedy is not found equal to it, proceed as follows:—Cut the hair from the belly, principally from the right side, beginning at the navel, cutting forward, around, and upwards, towards the sides, making a surface of fourteen or fifteen inches in diameter. Rub into this, every day, half an ounce of strong mercurial ointment, and every morning give the following:—

Powdered opium	half a dram,
Powdered gentian	one ounce,
Boiled starch	one pint.

Feed liberally, and give bean meal in a mash or otherwise; and if symptoms of salivation appear, omit the mercury, but continue the drink. I have used the prepared rust of iron, half an ounce in a ball, with advantage in these cases; but the benefit of the mercurial course is apparent in every instance of hepatic disease, and it is but very few of these cases but have their origin in biliary affection.

Scouring *in* Calves.

From a morbid stomach secretion, calves are very prone to diarrhœa; to remedy which, graziers give them chalk to lick. When the looseness has already appeared, they also give chalk in milk: others give suet boiled in milk, and which is an excellent domestic remedy: as likewise starch or bean flour boiled in their food. But when these fail, give the following, which is almost certain in its good effects:—

Prepared chalk	half an ounce,
Powdered opium	five grains,
Powdered alum	ditto,
Suet and milk, boiled	half a pint.

Sheep are subject to both the acute and chronic scouring; and *Lambs* are also liable to a similar looseness with calves. In either case, the rules already laid down exactly apply, making one-third of the quantities of the remedies the exhibited dose.

CRIBBITING.

This peculiar action is very generally, but erroneously, supposed to arise from a little air drawn into the stomach; and is hence called *sucking the wind*. But, I believe this idea of it to be very incorrect; and that, on the contrary, it consists in the simple eructation or forcing out of a little gas let loose from morbid combinations within the stomach, which, as it proves a source of irritation to the organ, and painful to the animal; so, to promote its expulsion, he applies his teeth to a fixed point, by which he gains the aid of some of the muscles of the fauces to open and straighten the œsophagus, while, at the same time he, by means of the abdominal muscles, presses on the stomach and forces out a little of the irritating air. Exactly the same process takes place in ourselves, except that we have no occasion, from the peculiar shape of our pharyngeal opening, to gain a fixed point for the teeth; but, in every other respect, human eructation in dyspepsia is conducted in the same manner. It also appears that, from a morbid sympathy

in *heartburn*, the most painful part of the affection is felt at the upper part of the throat; and it is more than probable the same occurs in horses, which will serve to account why a strap buckled tolerably tight round the upper part of their necks puts a stop to the action. The sensation in the *part* is, by this means, altered or deadened; and such a horse is also conscious that he can by no effort any longer increase the dilatation of the pharynx.

That cribbiting is dependent on dyspepsia there are many proofs. Turning out to bad keep, particularly in a straw yard, is a fruitful source of it. Bad hay, musty oats, or other indifferent food, will also occasion it; and it is likewise observed to come on spontaneously in *well-fed* horses who are much confined in the stable; in which cases persons erroneously consider that it is acquired from idleness or tricks; and as, perhaps, others so situated may become the same, these instances are then equally erroneously attributed to catching it from one another. The fact is, that the confinement breeds dyspepsia, and the animal commences cribbiting to relieve himself. Another proof of this is, that cribbiters seldom accumulate flesh: it is not the mere action of cribbing that can prevent this; it is the dyspepsia or affection of the stomach that does it.

As stated above, the simple action may be prevented, but the effects are not obviated, for such horses do not accumulate flesh afterwards. They however are prevented from wearing the manger, or their own teeth, and a stop is also put to an unpleasant noise. The strap placed round the neck should be not less than two inches and a half to three inches broad; and care should be taken that it is tightened only to the degree necessary to stop the cribbing, without injuring the animal. In several instances, at the commencement of the complaint, I have cured it by alteratives, and by turning out: but when it has existed some time, the formation of air becomes natural to the animal, and the habit is never relinquished.

Class VI.

Diseases of the Glands.

JAUNDICE.

Icterus.

THE *yellows*, as jaundice is called by farriers, is, as a distinct affection, unfrequent in the horse, from his liver being less complex, having only hepatic but no cystic bile. But, as a symptomatic af-

fection, it is sufficiently frequent; for whenever any great abdominal inflammations occur, the liver is liable to participate; bile then passes into the blood vessels, and from thence is thrown on the skin. Now and then, however, a more slow and primary affection of this organ occurs, and the bile is either increased in quantity, altered in quality, or obstructed. In the former case, purging accompanies the other symptoms: in the second, the evacuations are ordinate; but they are constipated in the third and most numerous class; and, in all, the bilious tinge of the skin is invariable.

Symptoms. — The inner surface of the eyelids, nostrils, and mouth, looks of a dingy yellow; frequently the dung is hard, dry, and sparing; there is also a particular listlessness, laziness, and early fatigue, about the animal, with hot breath, sickly appetite, and high-coloured urine.

Treatment.—We must attempt to produce a healthy action in the liver, or we must remove its obstruction. To promote these intentions, as in the greater number of cases costiveness is present, begin by giving the following:—

No. 1.—Calomel (*submuriate of quicksilver*) . . one dram,
Aloes . . . . . two drams,
Powdered gentian . . . . . ditto,
Castile soap . . . . . ditto.

Form into a ball, and give every morning until the bowels are opened; and then continue only so much, for a week or ten days, as will keep them lax but not purged; after which stop ten days more, and recommence till all vestige of the complaint ceases. But in cases where a relaxed state of bowels is already present, give the following instead:—

No. 2.—Calomel (*submuriate of quicksilver*) . . one scruple,
Blue vitriol (*sulphate of copper*) . . one dram,
Gentian, in powder . . . . . three drams,
Oak bark, ditto . . . . . ditto,
Camomile, ditto . . . . . ditto.

Make into a ball, and give night and morning, unless the mercury should affect the mouth, in which case give only one a-day; and should the looseness increase on this plan, add powdered opium, half a dram to each ball. In all cases of *yellows*, a change of food is proper, and generally necessary. In winter, spear the corn, or give carrots; in summer, soil, or turn out to grass; but, in such case, avoid exposure to the night air, and keep on a rug in the day so long as the calomel is continued.

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Jaundice *in* Oxen *and* Sheep.

These animals having a gall bladder and cystic duct, are more liable to these *obstructions*, and hence this complaint is more fre-

quent among them. It is very common in some of the cold provinces on the Continent, where these animals are stall-fed in winter; from which most of them are attacked with it in the spring. The cure is promoted, in these cases, by turning them into grass lands. In England it is less often the consequence of confinement than of a slow inflammation of the liver. In such instances, therefore, treat exactly as detailed under this head in horses, regarding, at the same time, the strength and size of the beast.

BLOODY URINE.

Farriers term this *pissing of blood:* it arises sometimes from inflammation of the kidnies, in which case it must be treated as under that head: it may accompany a stone in the cavity of the pelvis of a kidney, or an ulceration of any of the urinary passages; but these are unusual causes. Violent exercise, by rupturing the small vessels of these glands, produces it more often, and therefore it frequently follows hard riding.

The *Cure* must consist in restoring the healthy action of the parts, and promoting a healing of the vessels; and, particularly, in avoiding violent exercise and heavy weights. Diuretics are always hurtful. Mild astringents are proper, as alum, catechu, dragon's blood, logwood, &c. I have also known great benefit to be derived from a large strengthening plaster across the loins. In one instance, the following, given once a-day, produced excellent effects, after many other means had failed:—

Sugar of lead	ten grains,
White vitriol	two scruples,
Japan earth	four drams.

Make into a ball with conserve of roses.

In another obstinate case, a cure was brought about by turning to grass, having first covered the loins with a strengthening charge.

Bloody Urine *in* Cattle.

This disease among cattle is called *red water*. When there are strong marks of fever, the complaint probably proceeds from inflammation of the kidnies, and must be treated as under that head; but when the symptoms are milder, and the urine is simply tinged with blood, then treat exactly as is recommended above.

PROFUSE STALING.

Diabetes.]

This is not a very frequent disease in the horse, but, however, occurs sufficiently often to require all our attention. It first appears by the making of five or six times the natural quantity of urine, which is milky or watery, and now and then, in very bad cases, deposits a sediment, which, when subjected to experiment, does not differ in taste, colour, or appearance, from common sugar. It is attended, in these latter instances, with great emaciation, for the absorbents act violently, not only on the fluids, but on the solids, converting every thing into blood, from whence this fluid discharge is formed: hence the weakness is great, the thirst excessive, and appetite voracious; the pulse is likewise usually quickened. But in the more ordinary cases of the *pissing evil* of the horse, the kidnies appear to be topically affected with a *simple increase* of their action, brought on by the effects of something taken into the stomach, as bad hay, musty oats, &c.; and now and then, from the exhibition of violent diuretics, something like a morbid action continues: but less frequently does it appear to arise from a deranged state of the digestive and assimilating powers, as is suspected in the human.

Treatment.—When this disease, as is usually the case, arises from improper aliment, it must be immediately changed; and, therefore, when no other apparent cause is manifest, the food ought to be particularly examined. When it occurs from the use of violent diuretics, moderate doses of catechu and alum, with oak or willow bark, will effect a cure. When, however, from its violence, and the presence of a sweet taste in the urine, there is reason to suspect that the disease exists in a deranged secretory structure of the kidnies, and not the mere effect of external stimulants; or, perhaps, originating in a diseased absorbent or assimilating system; in such cases try the following:—

Liver of sulphur (*sulphurated potash*)	two drams,
Uva ursi, in powder	four drams,
Oak bark, ditto	one ounce,
Catechu, ditto	two drams,
Opium, ditto	half a dram.

Mix with a pint of forge water, or other liquid, and give daily. In very desperate cases, instead of other drink, broth or tripe liquor might be substituted.

Class VII.

Diseased Collections of Fluid within circumscribed Cavities.

DROPSY OF THE HEAD.

Hydrocephalus.]

I NEVER heard of more than one or two instances of this disease in the horse; but it may now and then occur, probably from previous inflammation of the brain, when serum is thrown out into the ventricles, or any of the cavities of the skull. The *Symptoms* greatly resemble those of staggers, and the *Cure* will be best promoted by medicines exciting the waste of the watery parts of the blood, as diuretics, and of those exciting the absorbents, as mercury, &c.; blistering the head would be also proper, and rowelling the throat.

DROPSY OF THE CHEST.

Hydrothorax.]

This, as a primary affection, is a rare occurrence, but, as a secondary one, it is very common; and then consists in a collection of fluid within the cavity of one or both pluræ.

It appears by a quickened and difficult breathing; a feeble, irregular, and peculiar pulse, from the pressure on the heart; the urine is sparingly made, and water may be heard on striking the chest: but care must be taken not to mistake water in the stomach for it. It is easily detected by the fear the animal shews to be moved quickly; or to have his head held up; by his disinclination to lie down; but, more particularly, it may be detected by feeling the heart, which evidently, in these cases, beats with a tremulous thrill, as though it was vibrating through a bladder of water. There is likewise usually a flow of yellow serum from the nose, with some cough.

It may arise from a defect in the absorbents; or from an increase in the action of the exhalents, which is probably the most usual cause. It may be both chronic and acute, but it is more frequently

the latter, the effect of inflammation of the lungs; and usually, in these cases, terminates in suffocation.

Treatment.—It might be attempted to promote its removal by stimulating the absorbents, and lessening the quantity of serum in the blood; but as these would probably fail, secure the horse, and make an opening on the suspected side, not far from the sternum, to gain a depending orifice. To effect this, the skin may be drawn to the anterior edge (see *Intercostal Arteries*, page 129) of either the seventh or eighth rib, and with a scalpel an incision should be carried carefully through the skin and muscles into the pleura; a canula may be then introduced into the opening, and fastened around the horse till the whole water is evacuated. If the water occupies both cavities, both sides must be thus punctured.

When matter forms within the chest, its removal may be also effected in the same manner.

DROPSY OF THE BELLY.

Ascites.] [*Ascite.*

This is a very unusual disease in the horse; now and then, however, it does take place after inflammation of some of the abdominal viscera. It consists in an increased deposit of fluid within the cavity of the peritoneal sac, being seldom encysted in the horse.

It is known by the tension of the abdomen, and by the undulation felt by one hand when the belly is gently struck with the other. The urine is made in small quantities, the thirst is great, and the horse is short breathed.

It may arise from an increased action of the exhalents, or a deficient one of the absorbents, by previous inflammation, by hydatids, or by long-continued jaundice.

The *Treatment.*—In these cases it would be fortunate if we could ascertain whether the absorbents or the exhalents were in fault at the origin of the complaint. To promote the *Cure*, however, in either case, we must stimulate the arteries to throw out their superabundant fluid by other emunctories, as the bowels and kidnies: diuretics are therefore principally to be resorted to; and the more so, as in the horse we have greater power over these glands than in the human. Strong purges likewise promote a serous discharge, but, from their weakening effect, cannot be very often repeated. The absorbents may also be stimulated by mercury, or other means known to have the effect of acting on them. A horse might also be tapped very safely; but in whatever way recovery was promoted, the recurrence should be prevented by strengthening the general habit.

Class VIII.

Diseased Collections of Fluid within the Cellular Membrane.

DROPSY OF THE SKIN.

Anasarca.] [*Œdéme.*

THIS is variously called by farriers. It does not materially differ from ascites either in cause, effect, or cure; but is very different in its seat, being generally, or partially, diffused through the cellular membrane of the skin. When it is partial, it usually occupies the legs, the sheath, or the lips: when general, every superficial part of the body becomes affected. It sometimes is joined with farcy, but is then purely symptomatic, and occasioned by no specific poison, though sometimes it produces troublesome ulcers, and has then been called *water farcy*. It is particularly characterised by the indentations of the skin remaining, when the pressure occasioning them is removed.

It may be brought on by all the causes of ascites, and is frequent in spring and fall, when horses are weak from moulting. When partial, it is not difficult of cure; when general, it is more obstinate. Violent fever and inflammatory affections terminate sometimes in general œdema, or water farcy; and which cases are generally, though not universally, fatal. I have more than once successfully evacuated these œdematous swellings by small punctures with a lancet, following up the treatment with tonics.

Cure.—Feed nutritiously, and use similar means as in ascites or dropsy of the belly; to which add vigorous rubbing of all parts of the body, and considerable walking exercise. Alteratives and mild diuretics should be tried; but if the horse is in a weakened state from any previous affection, give tonics, as arsenic or the sulphate of copper, with bitters, oak bark, camomile, &c. (See *Condition*, page 56.)

SWELLED LEGS.

Anasarca.] [*Enflure des Jambes.*

THIS is a most common disease, affecting sometimes the fore legs, sometimes the hinder, and sometimes both; but nine times out of

ten, when it attacks the one of these only, it is the hinder ones. Swelled legs may be occasioned by inflammation, and prove phlegmonous; but the species we allude to, is a kind of local anasarca, and consists in an increased deposit of fluid within the cellular membrane of the limbs, commonly the lower parts. When long continued, it so weakens the skin as to break out in the form of cracks, yielding serum; gradually, however, the whole of the secreting capillaries of these parts throw out pus, and the disease then becomes what is called grease.

Causes.—This complaint always originates in weakness; but this may be general over the whole system, or confined to the legs only, in consequence of the increased strength and action of some parts overbalancing that of others. That debility occasions it we know, for at the close of long continued diseases that weaken much, the legs always swell; and it is reasonable to expect they should do so, when we consider how far they are removed from the heart, the source of circulation; added to which, the fluids in them have to move in a direction perpendicularly against their own gravity: the veins therefore finding a difficulty in propelling their contents, cause a species of stoppage in the capillary arteries, which are thus stimulated to throw out more fluid into the cellular membrane. The absorbents may be also affected, but it is more than probable they are the least part of the cause, for we find them, in these cases, equal to full action on the increase of stimulus; that is, a little exercise soon removes the whole swelling. Sudden changes in the temperature of the atmosphere that horses are used to, or in the degree of clothing they wear, or hasty alterations in the nature of their food, may occasion swelled legs; this they may do either by diminishing the means that keep up life, and hence produce a *general* debility, or, by adding to the means that promote life, a general plethora may ensue, but a *partial* debility is the consequence; for the balance of power being unequal here, the cause accumulates, and swelled legs appear. Thus it is, that when horses removed from grass, or from a straw yard, are brought at once into a hot stable, and fed highly, they become leg-swelled immediately; for the powers of life are unduly pushed before the parts have taken on a capacity for this increased action. Therefore arises a necessity for bleeding and physicking in these cases, but which are found to be less necessary when this alteration is gradually brought on. Standing in the stable, with a full allowance of food, and little exertion, acts in the same way, and from the same cause. Hence exercise is doubly useful, by promoting other excretions, and by the increased action it excites in the absorbents. On the contrary, turning horses out to a straw yard from full feeding, warm clothing, and a hot stable, may bring on swelled legs, by occasioning a general debility: but so much do horses improve as they approximate a state of nature, that though this is an equal change with that of removing them hastily into stables, yet they comparatively seldom suffer from this.

Standing in snow, or cold water, produces swelled legs, by weakening the parts, and by being unfavourable to absorption. It is very usual also for horses to have œdematous extremities in autumn, at which period the powers of life are unequal; there being an increased action in the skin to produce new hair rapidly, and therefore debility arises in the rest of the parts, and more particularly in those remote from the seat of circulation: in short, whatever produces plethora in the constitution without proper exercise to make the waste equal to the increased secretions, may occasion these enlargements, by encouraging a *partial* debility; and whatever brings on *general* debility may occasion it, as these parts may necessarily suffer in a greater degree than those more within the sphere of the heart's action.

Cure.—This will not be difficult, when we make ourselves master of the cause. In removing horses from grass to the stable, with the precautions mentioned, it may be prevented; but when it does occur, it must be combated by lessening the general action of the vascular system at large, at the same time increasing the individual strength and tone of the affected parts in particular. For this purpose, bleed; reduce the diet, if too full; give bran mashes and alteratives, with three or four hours walking exercise every day: intervene one or two doses of active physic; and, if very obstinate, insert a rowel in each thigh: in general cases, however, these are unnecessary. But when swelled legs occur in a horse that is thin and impoverished, feed liberally; give mild diuretics, united with tonics, as prescribed in dropsy: purging in this case, though it lessens the swelling *momentarily*, by carrying off the watery parts of the blood, yet increases the enlargement *finally*, by weakening the system in general. Apply friction to the legs; use gentle exercise, but not to produce exhaustion. The weakened vessels having been long distended will perhaps not easily gain their tone; they may in this case be assisted by bandages moistened in astringent solutions: when it occurs among cart horses, haybands may be used for this purpose, dipped in cold water, in which some grooms and carters are very expert. In other instances, strong woollen of any kind may be made use of; but flannel is the best, evenly and firmly applied in a roller of three yards in length and four inches in breadth. But there are cases when the legs appear to become habitually enlarged, or the recurrence of the swelling is frequent or constant; in these a permanent bandage is best, produced by firing, and should be done in nearly perpendicular lines; for, by corrugating the skin, and in some measure lessening its elasticity, it becomes itself a bandage to the weakened vessels; but if the firing is done in any other than a perpendicular or nearly perpendicular direction, the effect is in a great measure lost. See this subject farther pursued in *Grease;* see also *Condition.*

Class IX.

Calcular Concretions.

STONE IN THE INTESTINES.

FROM the horizontal situation of the horse, a stone does not gravitate so much in him as in the human, and, therefore, calcular concretions frequently remain, and accumulate till their size prevents their expulsion. They are most frequent in the large intestines, and the point of the cæcum is a very common situation; which may be accounted for by considering that this part appears least exposed to the action of the peristaltic motion. Little inconvenience is felt, probably, so long as the stone remains small; but when it has become large, it is the cause of frequent colics, and in the end it usually proves fatal, and is from the first without our means of relief.

STONE IN THE KIDNIES.

SOMETIMES, though very seldom, stones form within the cavity of the pelvis of one of the kidnies. In the human these do not often remain long, but, by their gravity, fall into the bladder; in the horse they accumulate, till they fill the cavity of its pelvis. The kidney does not appear to suffer much for some time, but continues to secrete; in the end, however, disease is brought on, and the irritation kills.

It can only be removed in the early stage by diuretic medicines, which might relax the passages, and wash away the small concretion.

STONE IN THE BLADDER.

THOUGH this seldom occurs in the horse, yet we have undoubted evidence that it now and then takes place. Mr. Clark, of Edinburgh, informs us he has several, taken out of different horses. Dr. Mead had one in his cabinet that weighed eleven ounces. The presence of a stone may be detected by examining the bladder by means of the rectum, and its removal might be effected in the same manner as is practised from the human bladder; that is, an open-

ing must be made from the membranous angle of the perinæum, sufficiently large to admit a forceps to extract the stone with.—(See *Inflamed Bladder.*)

Class X.

Morbid Poisons.

HYDROPHOBIA.

Rabies.] [*La Rage.*

THE rabid malady seldom occurs in horses, and, when it does, it arises from the bite or contact of matter produced by some animal, generally from a dog, labouring under this dreadful complaint.

The *Symptoms* in a horse are various; it usually, however, commences by great apparent distress, and sudden breaking out into profuse sweats; at length the horse becomes unruly, he stamps and paws violently, and attempts to disengage himself from his halter.

Though *madness* is a complete misnomer in the dog, it is by no means so in the horse; for within twelve hours from the attack he usually becomes frantic: and I have seen one, level with the ground the whole of the internal fitting up of a six-stall stable, himself sweating, snorting, and foaming amidst the ruins. The disease follows the inoculation, or bite, at the same periods as in other animals; that is, from five weeks to three months: but I have observed, as in dogs, its attack is always soonest when the bite is received in the head. On examination of the morbid appearances after death, in two cases, there were great inflammatory marks in the lungs; the stomach and bowels also participated in the affection.

Treatment.—Our efforts must be principally directed to a *preventive* plan; for nothing we yet know of will arrest the disease when it has actually appeared. In the human subject profuse bleeding has been said to have succeeded, and it might be worth the trial here. When a bite has been received, immediately dissect out the wounded part, or, if only superficial, apply a caustic to it; but when deep or much lacerated, dissect the part carefully out, and afterwards apply the caustic. When this is properly done, no fear need be entertained for the safety of the animal: but it is very difficult often to decide that no *other* bite has been received. As, therefore, the

preventive efficacy of the tree box, to a certain degree, is now fully established, give also the following:—

Box leaves (if possible, the tree box) . . eight ounces,
Rue . . . . . eight ounces.

Cut very fine, and boil in three pints of milk in a close vessel for one hour; then remove and strain off. Again, boil the ingredients another hour in three pints of water. Again, strain off, and mix the liquors. Give a third of the mixture every morning fasting. A *cow* may take the same quantity, and a *sheep* one-third of it.

THE BITE OF VENOMOUS REPTILES.

Many of these, in warmer climates, inflict fatal wounds both on man and beast. In the East Indies, the cobra di capello will occasion death in the largest animal in a few minutes: fortunately we have none of the serpent tribe whose bite or sting is poisonous but the adder; this now and then stings horses and oxen while grazing, and sometimes dogs in hunting. This wound is not very frequently of much consequence; and country persons, in these cases, merely rub the part with an onion, and force another, mashed, down the throat, which may not be injudicious. In more serious cases the following will give relief:—To a horse, ox, or cow,

Spirit of hartshorn (*liquor of carbonated ammonia*) one ounce,
Olive oil . . . . . a pint.

Mix, and give.

To a sheep or dog a third of this quantity may be administered, and the wounded part likewise bathed with oil of turpentine. In case the above cannot be got, oil of turpentine internally may be substituted; or a large glass of brandy with half a pint of melted butter; or gin and melted butter, of each half a pint. The stings of hornets, wasps, and bees, may be successfully washed with vinegar.

VEGETABLE POISONS.

Though, from the great quantity of cuticular coat to the stomach, the horse is not very easily poisoned, yet now and then by design or accident it may happen. The effects of vegetable poisons are very different from those of mineral: in the former we are not aware of their precise mode of acting; the lauro cerasus taken into the stomach kills even the horse very speedily. The nightshade, and the nux vomica or crow fig, are also extremely delcterious to animals, but it requires a large dose to affect the horse. The vegetable acid, or vinegar, proves obnoxious to the horse's stomach in large

doses, destroying by its sedative quality probably. It is very necessary to beware of this, as in moderate doses it is useful, and often recommended. Tobacco is very deleterious; an ounce only has proved fatal. The vegetable poisons of the more powerful kind destroy nearly without pain, and occasion hardly a struggle; indeed, life is, as it were, stole imperceptibly away; and nearly in all they appear to produce their fatal effects by some immediate action on the sensorium, or nervous system. Animals, destroyed by vegetable poison, soon become putrid.

We cannot hope to effect the removal of poison by vomits in the horse; but we may do it in the cow, sheep, or dog, by considerable doses of emetic tartar, or of white vitriol. We must therefore, in the horse, counteract the effects by a liberal use of acids and demulcents, as oil, butter, &c.: but in such cases the caution with regard to vinegar must not be forgotten; half a pint may, however, in urgent cases, be safely given, or a dram of oil of vitriol (*sulphuric acid*) may be infused in a pint of water, and poured down.

MINERAL POISONS.

These act in a very different way to the former, and, from the great portion of cuticular coat to the stomach, a horse can take a very large quantity without being materially injured. Four ounces of emetic tartar will not kill; nor will a quantity of oxymuriate of quicksilver (*corrosive sublimate*), sufficient to destroy five or six men, have any effect on a horse. Arsenic likewise, in moderate quantities, does no harm but in very large doses; both this and the corrosive sublimate occasion intense pain, and become caustic to the stomach, producing ulceration, mortification, and death in a few hours. Copper, in large doses, produces inflammation and violent attempts to retch, and is likewise very fatal. I do not know what effects lead would produce as a poison, but I know the stomach of the horse will bear an immense quantity without irritation. When the more active mineral poisons, as the caustic preparations of mercury and arsenic, have been taken, in a short time the animal expresses great pain and distress; the mouth is hot, and a viscid ropy mucus hangs from it; the breath also is heated and fœtid, and the flanks heave. The pulse is always quick and small, and the poor beast, from excess of pain, will roll, look round at his sides, and make frequent attempts to stale and dung. Cold sweats will break out, while the extremities will be alternately hot and cold, until towards the termination, when they will remain invariably cold; at which time also bloody evacuations will appear, and, during the whole, there will be distressing nauseating efforts.

When there is a suspicion that mineral poison of any kind has been given, do not follow the common practice of giving oil; for the more active mineral agents, as mercury, arsenic, and copper,

have their deleterious effects best combated by *alkalies*. Two ounces of liver of sulphur (*sulphuretted potash*) may be dissolved in thin gruel and given; or, in the absence of this, dissolve an ounce of common potash, and give; or, as a substitute, a strong ley of wood ashes may be made and poured down. When lead produces deleterious effects, they are best resisted by mercurial purgatives promptly administered.

If a horse dies from the exhibition of *vegetable* poisons, dissections seldom detect much morbid appearance: nevertheless the stomach is sometimes slightly inflamed; and what is remarkable, the lungs almost always prove so: but the marks exhibited are not sufficiently characteristic to draw a definite conclusion therefrom. But when any of the *mineral* poisons have been taken, the appearances are more striking; an early decomposition and putridity take place, and a remarkable fœtor also, which circumstances are in these cases peculiarly strong and characteristic. The stomach will be highly inflamed, the expellent orifice more particularly so, and the whole villous surface is usually studded with gangrenous spots, surrounded often with bloody matter. The intestines also will participate more or less in the same appearances; and which appearances, with the suddenness of the attack, and the rapidity of the progress of its fatal effects, will serve to distinguish it from inflammation of the stomach from other causes. The emptiness, likewise, of this organ, and the inclination to purge in these cases, will serve to point out its non-relationship to stomach staggers.

These symptoms, and these distinctions, if well attended to, will, in general cases, serve to guide the practitioner in his opinion as to the probability that *poison* has been administered: but it will be also necessary for him, in many instances, to detect the actual kind of deleterious matter used; for which purpose he must have recourse to the aids of chemistry. A few familiar and ready *tests* we shall detail for his use.

Chemical Mode of ascertaining the Exhibition of Poison.

When a quadruped dies in such a way as to raise suspicions of its having been *poisoned*, a veterinary surgeon will be often called upon to decide, not only whether such is the fact, but it will also be further necessary for him (to promote the ends of justice) to be able to decide upon the kind of noxious matter used, and to prove its actual existence. In the human subject, and such quadrupeds as vomit, it is difficult to do this frequently, because the stomach has acted so violently as to carry off all the noxious matter; though the inflammation raised has yet destroyed. In such cases some of the *early* evacuations of both the stomach and bowels should be carefully sought after and subjected to experiment. In the horse, though vomiting does not take place, yet an expulsion of the contents of the stomach into the intestines will equally occur, and the remedies given will have probably tended farther to wash it clean: however, the folds of the inner coat should be industriously searched,

and any suspicious matter dexterously scraped off. The liquid contents also, if any, must be carefully saved, and those likewise of the intestines; after which, all or any portion may be subjected to the following tests.

If there appears, in either the stomach or bowels, any *gritty* substance, like the sediment of an infused powder, carefully separate it, and expose a few grains to the action of a red hot iron, as a heated fire shovel, &c. If a garlic-like smell is produced, arsenic is present; but corrosive sublimate yields no odour in this way. Next place a few more grains on copper heated highly, until the matter exposed burns away; when, if a determinate white mark is left, that likewise shews the existence of arsenic, but still proves nothing with regard to the mercurial agents. If therefore, after these tests, the matter remains undetermined, proceed to mix some of the contents of the stomach and bowels with a solution of vegetable alkali, as salt of tartar, or potash; after this has stood some time, mix with it a solution of the sulphate of copper (*blue vitriol*); if a lively green is produced, still arsenic may be considered as present; but should the oxymuriate of mercury (*corrosive sublimate*) be the existing poison, no such appearance will occur, nor will any decomposition take place: but another test must, in such case, be resorted to, which will readily detect its presence; this is to infuse, as before, some of the stomach and intestinal contents in a portion of lime water; when, if an orange-coloured sediment falls, it clearly proves that the suspected matter is corrosive sublimate. To detect verdigris, add a little pure ammonia to the suspected liquid contents; and, if it exists, a beautiful blue will present itself. Two or three drops of sulphuric acid (*oil of vitriol*), being added to the suspected mixture, will discover the existence of lead in it, by the exhibition of a *white* powder: a little lime added will do the same; except that the result will be the fall of a *black* powder, if lead is present.

LOCAL INFLAMMATION.

Principles and Doctrine of Inflammation.

The body of the horse is liable to an alteration in the structure and functions of its several parts, from the effect of injuries, or from causes connected with the actions of the body itself. These form *local diseases*, which it is the duty of the *veterinary surgeon* either to remove, or to obviate the ill effects of, and which is called *the practice of veterinary surgery*.

As *inflammation* is the *cause* of many of these local diseases, and the almost constant *attendant* on every one in some part of its progress, it becomes very necessary to consider it as a *principle*. In-

flammation appears to be an increased action of the vessels of a part with an increase of the fluids within them. When the heart, and the whole of the vessels arising from it, are in this state, it forms *general* inflammation; but when the vessels of one part only labour under it, it is called *local* inflammation. The former we have already treated of; the *latter* forms our present subject. An inflamed part has not probably, as has been supposed, more strength, but, on the contrary, appears to be in a state of increased and acquired debility; for the action is carried beyond the powers of the part, and they become weakened in proportion to their efforts to overcome the distention occasioned by the afflux of fluids to the part. Inflammation must not always be regarded as a diseased action; at times it is the most salutary one; for without this, healing cannot be brought about in wounds; and in these and in many other instances we even excite inflammation to produce beneficial effects. Inflammation presents several *varieties*, according to the causes producing it: the immediate functions of the parts it attacks, or their particular structure; and likewise according to the degree of violence it assumes. The inflammation *caused* by a blow, producing a bruise with simple extravasation, is very different from that arising from the application of a blister. And a simple incised wound produces different appearances and effects, from the laceration occasioned by the bursting of a tumour.

The *particular functions* of a part influence these *varieties* materially. The inflammation of a secreting surface produces pus without apparent ulceration; but in a part supplied only with exhalent capillaries, ulceration and an abraded surface must take place before *matter* is formed. The inflammation of organs essential to life, produces different effects from the inflammation of other parts not immediately so: the termination is usually more rapid; and from the derangement it occasions to the vital functions, and the great sympathy produced in the general system, life is destroyed when the injury to the part is comparatively small, to what another part less important is capable of bearing. There requires also a *similarity* in *functions* to extend inflammation: hence, when the kidney is inflamed, the adipose substance surrounding it does not readily inflame, nor the psoas muscle; but where the intestines become extensively inflamed, the peritoneum becomes so likewise; for here is a similarity of structure, though not of functions; but in those who die of dysentery this does not take place; for here the villous coat only is affected, both the structure and functions of which are different from the peritoneum.

The *particular structure of parts* gives great *varieties* to the appearance, effects, and termination of inflammation. This affection in the lungs of horses rarely terminates in suppuration, but often in effusion of serum, and frequently in gangrene also: inflammation of the pituitary membrane usually terminates in suppuration, but very rarely in gangrene; for between these there is a very great difference in *structure*. If by accident a portion of bone becomes de-

nuded, the part exposed generally mortifies; and its living powers being small, owing to its peculiar *structure*, it is long in being reproduced; but if a portion of muscle becomes burnt or torn off, inflammation soon brings on granulations, and a quick reproduction of parts.

The appearances, effects, and termination of inflammation, are greatly influenced by its *violence*. A mild inflammatory affection of the lungs terminates in resolution; a more active one in effusion: but when pushed to its greatest extent, it ends in actual gangrene. In an incised wound, if moderate inflammation occurs, adhesion takes place; if the inflammatory action is considerable, pus is formed, and granulations arise.

The general terminations of local inflammation are three; resolution, suppuration, and mortification. Inflammation seldom ends in the horse in indolent indurated tumours, except the small ones present in farcy, and some ligamentary enlargements; but very few take on the confirmed character of schirrus.

Resolution occurs when the distention of the inflamed vessels ceases, and they recover their tone; which are denoted by a subsiding of the swelling present on these occasions, an abatement of the heat, and a lessening of the irritability and sensibility of the part.

Suppuration takes place when the inflammation is pushed beyond a certain limit; and appears a particular state of the inflamed vessels, in which they take on a disposition to throw out a whitish matter termed *pus*. The formation of it is attended with circumstances of a particular kind; and when there has been a loss of parts, the purulent inflammation is followed by the formation of granulations which repair the waste. Pus is produced on secretory surfaces without apparent ulceration: in other parts, ulceration is always attendant on its formation.

Gangrene has its origin in the increased debility of a part, either original or acquired. It is original, when the system was in a previous state of debility. Gangrene may be said to be acquired, when the debility has been brought on by excess of action in that part alone, which has been so great as to overcome all the living powers immediately belonging to it.

The *treatment of inflammation* must be much varied according as the tendency to these different kinds of termination exists; but when it is in our power, there are but few instances in which we should not choose the termination by *resolution*. The first indication to produce which, is to restore and equalise the balance of power between the parts; and this must be done either by bringing the system at large down to the level of the affected parts, or to raise the tone of the parts to the level of the system. The former is only to be attempted when the general plethora is great; in which case we make use of general bleeding and rowelling, with purging and urinary evacuations: but in some instances topical bleeding is more advisable, as it strengthens the part, and brings it up to the general

state of the constitution: this it does by emptying the vessels immediately affected, and thereby giving them an opportunity of contracting on themselves; but, when we attempt this by general bleeding, we sometimes reduce the system at large too much before we can produce any effect on the inflamed part. In local inflammation, therefore, topical bleeding is sometimes to be recommended, and should be practised as near the affected part as possible; but the hairy covering of the horse renders local bleeding less convenient in him; and we more usually practise it generally; and when the local inflammation is very great, it is essentially necessary, to prevent the constitution from suffering. Fomentations and poultices are to be used, which are useful in producing a determination to the skin, whereby the capillaries of the part unload themselves in the form of sweat, or exhalation, and recover their tone: but it must be remembered that heat increases action and the bulk of the parts, and, as such, is apt to promote suppuration; therefore, when poultices and fermentations are used, they should not be made use of too hot. It should be remembered, likewise, that cold diminishes action as well as energy, and increases the weakness of the vessels; therefore, in applying fomentations we should take care not to leave the part wet, for by this means evaporation takes place, and this we know is one of the greatest sources of cold. But circumstances may arise where the action is so inordinate, that we wish by all means to moderate it; in such cases the use of cold is of the utmost consequence: when the membranes of the eyes, for instance, are inflamed, we derive great benefit from *cold* solutions of lead. In the application of poultices we are to remember, they are principally useful while moist; but a moderately warm poultice, often removed, is a very proper application to promote resolution, and perhaps it does this better when the inflammation is some way removed from the surface, as it then tends to unload the vessels near the parts affected, without at all adding to their heat. And when the affection is still more deep, we then make use of blisters instead of poultices, which unload the vessels near the part; but when the inflammation is near the surface, we do not do this. Another indication by which we promote resolution is by applications that act immediately on the vessels, by giving them tone, and enabling them to contract on their contents: this may be very properly pursued when we are apprehensive that the heat of poultices might be detrimental, as when the inflammation is immediately on the surface, or when we can get immediately at the vessels themselves. The remedies of this description are lead, vinegar, &c., which may be applied in the form of cold poultices, at the same time such means may be made use of as tend to lessen the distending column in the general mass of vessels, without producing great debility; this is frequently done in the human subject by topical bleeding: but, from the before-mentioned reasons, general bleeding is more convenient in the horse, and may be further assisted by diuretics and sudorifics, in which only the excrementitious and watery parts are removed; but when resolution

cannot be obtained, and the heat and tenseness of the parts increase, we must conclude suppuration will take place.

When *suppuration* becomes unavoidable, it should be promoted, that the debility may not produce gangrene; and this must be done by attention to the system at large, the strength of which must be kept up if much reduced; and by the regular application of heat to the part affected, which is best done by the free use of poultices with a considerable degree of heat in them, both natural and artificial; the artificial may be turpentine: to promote the natural, such poultices should be frequently renewed. Fomentations would be, if persisted in, better, as renewing the heat oftener; but in these cases the part must not be suffered to cool, nor left wet: but when neither poultices nor fomentations can be used, the part should still be kept warm with a plaster over it, or with cloths; or may be thickly greased over, which promotes heat; for, as being a non-conductor, it confines it within the body, and prevents the effects of evaporation. In this state it is to be remembered, that if the general action of the system should be too strong, it is to be repressed; or the parts may be hurried in the end to such debility as will produce an entire loss of their tone, when mortification must ensue. When suppuration has been long continued, sometimes the vessels become so habituated to the action, that it is not easy to promote a healing process: in this case setons and rowels are introduced, to promote a new action.

Mortification.—When debility to a great degree takes place in a part under inflammation, by losing its powers it falls into mortification. If the adjacent parts likewise are not in a state of strength, they frequently participate in this, and become gangrenous also; but if they are strong, the absorbents are equal to the removal of the edges of the sound part, and by this means a separation of the dead from the living takes place. It is, therefore, our place to prevent this extension of death to the sound parts, and to promote the removal of the dead from the living. To effect this we must attend to the system generally, even more than to the parts individually, and upon a salutary effort of the constitution at large are we principally to hope this; for the parts themselves are already dead, and, therefore, external applications can do but little good: but we must particularly give such remedies as increase the energy and tone without adding to the action. This is best done by bark, tonic bitters, and by cordials, as malt, gruel, and even ale. Medicinal cordials, as opium, camphor, &c., when given, should be administered in small quantities, and often, that the action they produce may not be great, and their effect permanent. Scarifications are by no means to be made use of in the horse, for they only reduce the living parts into the same state as the dead: but their tone may be considerably and properly increased by the application of spirituous fluids, as vinegar and brandy in proper proportions; balsams and terebinthinated applications are also proper.

Class XI.

Wounds.

A WOUND is a solution of continuity, or a division of some of the parts of the body; and as wounds frequently occur to all the animals domesticated to our use, it becomes a matter of great importance for the veterinarian to be equal to the treatment of them. The surgical treatment of wounds differs in the horse from the human, in some measure from peculiarities in the constitution; but principally it differs in the *mechanical* parts of the treatment: therefore *veterinary* surgery cannot be perfectly learned from the most intimate acquaintance with the practice of *human* surgery.

A wound in the horse should be treated according to the particular circumstances which take place, as the nature of the wound, the part in which it happens, as well as the immediate structure of the substance divided, and the constitution and habits of the animal. When a wound occurs, it undergoes several states before the part is again made whole: hemorrhage first takes place, and, when the edges of the part are drawn together, the blood is included between these edges, or is poured out by them, and becomes the bond of union by coagulating; for after the vessels of the sides have ceased to bleed, they shoot through the coagula and organize it, when the junction becomes complete and the part whole: this is called *union by the first intention;* but which the generality of farriers prevent by immediately stuffing the wound with a tent, as candle, tow, or other substances, to produce what they term good matter. It may be remarked, however, that the excess of power in the vascular system in the horse usually hurries his wound into an early suppuration; and, therefore, this kind of union is not frequent in him, but we should, however, always attempt it. And for this purpose the edges of the part should be brought together as near as possible, and secured there: the only safe means of doing this is by means of sutures.

Sutures are nothing more than the sewing up of the wound with a needle and thread, or silk; but the needles made use of on this occasion are usually flat and crooked, or straight, with a triangular cutting point to penetrate the skin; the thread or silk used is waxed, and many times doubled, that it may not cut the parts, nor be acted upon by the moisture. One stitch is sufficient for every inch of wound, and each stitch should be inserted of sufficient depth, and should take in a considerable portion of skin, that it may not tear out; beginning on one side of the wound and coming out on the other, and then tying the ligature sufficiently tight to draw the edges together, but not to bruise the parts included. As many

of these stitches should be made as will completely draw all the parts together; for if any portion is left exposed, that part must of necessity go through the suppurative inflammation, &c., and hence protract the cure; but it should be remembered in making these stitches, that sufficient room is left between each for the blood to flow, or inflammation will ensue from the confined fluid; and on the other hand, if they are not near enough, they will tear out from the exertions of the animal, and render the wound worse than it was originally: therefore an inch between each stitch will be found a sufficient space. I need not inform the tyro that *the interrupted suture*, as it is called, has a separate thread for each stitch. The *twisted suture* is used instead of this frequently in the human, but becomes too complicated for the horse. The *glover's suture* is usually applied to wounds of the intestines, and consists of spiral stitches applied to each edge of the gut with a common needle, something in the manner that glovers sew.

The use of the suture must be strengthened by the application of adhesive or sticking plaister made of pitch, resin, or cobbler's wax, spread on strips, making one end of the strip stick to each side of the wound; these must likewise be fastened by a roller: and it is to be remarked, they are more particularly necessary in veterinary practice, from the increased tendency in the stitches in quadrupeds to ulcerate themselves out; for it is very difficult in any instance to retain them beyond the third day. The adhesive strips used should not be suffered to touch the immediate surface of the wound, but over it some lint or tow should be first applied. When a wound happens, and there are hopes of union at once, unless dirt or other extraneous substance is suspected to be within, it is better not to wash it, as by this means the pouring out of that blood that is to produce the union is often prevented, or the original bond washed away. Neither has any thing been hitherto said of the hemorrhage that always accompanies a wound; but when this is inordinate, it is to be restrained by the methods recommended in wounds of the arteries. By these means this ready union may now and then be brought about; but whenever it is attempted, the part should be watched, and if great pain, heat, and restlessness appear present, it is often prudent to divide the stitches: there may be some extraneous substances lodged within; some extravasation may have taken place, or the stitches may be too tight.

Adhesive inflammation.—The application of sutures to the horse is frequently rendered useless, from his tearing them out by rubbing, or by his teeth, or by the resistance of the parts: besides these, there are some wounds in which it is not advisable to apply them, as in very extensive or deep-seated ones; because in these cases, though union by the first intention was to be brought about on the surface, the parts below would undergo the maturative process, and we should then change the wound into an abscess. Nor would this mode be advisable when any extraneous body was suspected to be within it; nor is it practicable or proper when a wound is much

torn, and the edges bruised. But when a large wound is made, in which it is wished to observe the bottom afterwards, to remove any extraneous matter, or to permit the sloughs to pass away; in these cases the edges may be simply drawn together by a single ligature in each lip, which, tied together in a bow knot, can be undone at pleasure, and the bottom of the wound exposed.

In such cases as those described, then, the adhesive inflammation arises; that is, the constitution produces an increased action in the vessels of the part; coagulable lymph is thrown out, which becomes organized, and union is thus effected; and which is a desirable mode in cases where a wound is simple, and in which union by the first intention has been attempted, but has failed. It is best promoted by moderating the inflammatory tendency, and by inserting rowels in the neighbouring parts, by which the suppurative process will be prevented: no moist application should be made use of here, but the wound must be defended from the access of air, and the scab suffered to remain untouched. But from the before-mentioned reasons this process is also in the horse less frequent than the suppurative one, the description of which follows.

Suppurative process.—When, from the nature and extent of the wounded parts, or other circumstances, neither of the former unions take place, a higher degree of inflammation occurs, in which the constitution sympathises more; and there follows, if the wound is extensive, an increase in the pulse, and other symptoms of fever; the wounded portion itself becomes hard, swelled, and tender, and a thin matter flows out: this either ends in the death of some of the parts, if they were much injured; or the vessels, to reinstate them, first secrete a purulent matter called *pus* on the surface of the wound. The inflammatory symptoms now cease, and this forms the *suppurative* process: but if great debility before existed, as in an old or emaciated horse; and if added to this there had been much previous hemorrhage; or the parts were much bruised; or perhaps exposed to the cold; or if in the suppurative process itself the action has been extreme; the death of the part takes place, and mortification ensues, either around the edges of the wound, or it may extend to other parts of the body; and which it will, therefore, be the practitioner's care to prevent. When, therefore, a wound happens under the circumstances we have mentioned, particularly if extensive, or to a horse previously weakened, we must support the strength, as well of the system at large as of the parts themselves, in the manner laid down when treating of gangrene. But when inordinate action during this process takes place in a full plethoric horse, we must, on the contrary, lower the inflammatory diathesis by general bleeding, &c., and at the same time lessen the topical irritability by the application of mild fomentations or poultices, by which means we shall assist maturation; and should gangrene still occur, the separation of the living parts from the dead will have been promoted.

In general cases of wounds, as soon as suppuration is complete, the inflammatory symptoms cease, and this leads to the formation of

a new substance, termed *granulations*, which are intended to replace the chasm formed by the loss of the parts: in this way granulation continues till it reaches the surface, when exsiccation of the part takes place, and then the cutis is formed over it. The formation of the cuticle next begins, to which, if the injury has not been extensive, succeeds the growth of hair; but if it has, this is not replaced. In the process of forming granulations, the wound should be kept from exposure, but the applications used should be simple; for whatever is applied is more for the purpose of defending the part than from any peculiar operation on the sore. Great stress was, by the older farriers, laid on healing ointments, driers, digesters, and innumerable others. Modern surgery has discarded nearly the whole; but as occurs in other improvements, in correcting an evil, too much has been attempted. Experience every day shews that it is not equally indifferent to every wound what is applied to it. I have seen an ulcerated leg, that would bear *no* application with comfort, but the old compound *black* basilicon: the yellow, which is so little different, tortured the feelings to madness. Many applications promote a formation of granulations, as all the terebinthinated; but in the horse the flesh is apt to sprout too fast, except in very deep wounds, or those of glandular parts, in which instances we cannot promote their growth too much. In other cases, those called desiccative, as ointments of lead, calamine, or minium, &c., are peculiarly proper, as they defend, without promoting a luxurious springing up of parts. In all the rest, the ointment of wax is sufficient as a simple defence. When the granulations have extended beyond the level surface of the healthy part, they may be deemed diseased, and the wound will never heal while they remain so; on the contrary, it usually enlarges: for the pressure the luxuriant granulations make on the edges produces an absorption of the healthy parts, and thus increases the surface of the sore. This luxuriance must, therefore, be kept down by mild *escharotics*.—(See *Mat. Med.*)

In all extensive wounds the general health is to be attended to. Horses in full condition, and fat, ill brook disease; hence the inflammatory symptoms run high in them, and must be moderated by the means often recommended, as bleeding, purging, and mild diuretics, with rowels. Weak horses, on the contrary, in these cases sustain an additional debility in the part by the accident, with which the constitution sympathises much, and is rendered thereby very irritable; and the local action proves so morbid and unhealthy, that if gangrene is prevented, still locked jaw may ensue: therefore we should support such cases by liberal feeding and by cordials; the irritability we must also combat by opium and other sedatives. It must however be remarked, that it is not a debile state only that gives rise to tetanus or locked jaw; it is the produce of a peculiar irritation dependent on causes unknown to us, and produced as well in the robust as in the weakly, though, perhaps, not in equal degrees. Any injury may give origin to it; but it more frequently follows simple punctures and extensively lacerated wounds. Still,

however, its actual cause is wholly obscure; for though it is prudent, as a guard against it, to promote, as early as possible, a healthy suppurative process in the wounded part, and also to keep this up throughout; yet it will still, however, sometimes occur: nor does there, in every instance previous to its attack, appear any morbid state in the wound that can throw light on the subject. Nevertheless, in every instance where it can be done, the original sore should be actively stimulated after the tetanic symptoms have appeared. (See *Tetanus*.)

In every wound farriers meet with, their general practice is to *plug* it with something, as tents of various kinds; with tow, a candle, or some other substance; by which means very serious mischiefs are occasioned; and a simple wound is thereby rendered complicated and tedious. It is from this erroneous practice that sinuses are so constantly formed, and sores rendered extensive that were originally small: add to which, that the edges of wounds, by being in constant contact with *foreign* bodies, become hardened and callous, and are for ever incapable of union until they are removed either by caustic or the knife. Such are the evils attendant on this long-continued custom; and the only circumstances that can justify the use of these tents are, where there is a very deep wound, with a very small orifice; in which case it is certainly not prudent to permit the external opening to heal until it has become sound at the bottom: likewise, when any extraneous body is suspected to be within a wound, as a part of a stake, gravel, harness, clothes of the rider, &c., or when the bone has been injured; in which case its exfoliation being slow, if the muscular parts healed up, the exfoliated bone would become a foreign body, and occasion fresh irritation and a new abscess.

Having thus treated of wounds generally, we shall proceed to describe the various kinds individually, premising only the few following additional observations on the general subject. As the wounds of horses are more apt to exhibit too much power than too little; so they frequently by this excess of action, particularly when extensive, run into an inflammatory state, attended with danger. In such cases, besides the remedies already mentioned, we have a powerful auxiliary in *rowels;* and which, in full plethoric horses, should always be inserted in cases of extensive local injuries; and this as near the wounded parts as is convenient, by which the inordinate action will be greatly checked; and this is of so much consequence, that it should never be lost sight of. But when, on the contrary, from the extent of the injury, the action of the parts is really below the ordinate standard, proper applications must be used to stimulate the vessels into a more healthy exertion. Warm fomentations are among the foremost means to be used; and on their removal, that the flagging powers may not lose their stimulus, apply pledgets dipped in either tincture of myrrh, tincture of myrrh and aloes, tincture of benjamin (called Friar's balsam), or even oil of turpentine and common oil, equal parts of each; and, in default of these, common gin may be used with turpentine dress-

ings in the form of unguents over all. I cannot conclude, however, without warning the practitioner against this stimulating process on unnecessary occasions, as well as against that of filling up a wound with tents, or other extraneous matter: our business is to watch and assist Nature, not to interrupt her; and it will always be better to leave her to herself, than to interfere injudiciously, which it is the express intention of these instructions to prevent.

WOUNDS OF THE HEAD.

Wounds of the head should be managed according to the part they happen in; and it is first necessary to ascertain whether any injury has been done to the bones underneath: for in case the bones of the skull were proved to be fractured, the wound should not be merely dressed, but such means must be previously made use of as are directed under Fractures. When any part of the *ear* is much damaged, it will be better to remove the whole ear and its fellow. When, from accident, either the *parotid* or the other *salivary glands* become wounded, the greatest care is necessary to produce a speedy union, or the continued flow of saliva will occasion a fistulous sore. In wounds of the *eye*, or of the *eyelids*, the parts should be replaced as neatly and carefully as possible, having in view their future functions, so that their motions may not be impeded: in such cases, it is evident, no irritating application should be used, but every means made use of to avoid inflammation. In divisions of the eyelid, neat small stitches, near together, should always be introduced, and the horse secured from rubbing, by placing him in a box or barn, with his head tied to a beam in the ceiling, at the usual height, by which means he cannot rub it with his knee, nor his hind leg; nor will there be any rack or manger: he should also have a cradle constantly on his neck. In wounds of the *nose*, care should be taken to replace the bones if any are displaced; and, from the extreme irritability of the parts, only the mildest applications should be made use of. Such wounds are very likely to happen from kicks by the brutality of drivers, or from bullets in battle: the bones may be replaced, by the putting any firm substance up the nose well guarded with soft tow or rag; or the fingers may be used if they can reach so high, and the external wound should be closed to prevent the unnatural access of the air. In such a case, whatever is passed up the nose must be soon removed, unless it is hollow; as it is needless to remark that the horse breathes naturally only by the nose.

WOUNDS OF THE NECK.

If by any means the *neck* becomes wounded in the ligamentous part, a depending orifice should immediately be made, and the wound

dressed with terebinthinated or other warm applications, by which the part may be stimulated into an healthy inflammation, and sinuses prevented from forming. When a wound penetrates the œsophagus, all causes of irritation should be avoided, and the external wound closed, first uniting the edges of the gullet very carefully by the glover's suture; to do which, the tube itself must be brought into view, and the parts around it divided, if necessary, for the purpose. The œsophagus may also be divided purposely in cases of strangulation, from the passage of too large a ball, an apple, or the accumulation of bran or chaff, which has taken place in greedy horses. In such a case, as this tube inclines rather to the left side, the opening should be made there, and opposite to the obstructing matter; the section should likewise be carried longitudinally or lengthways of the neck, which will be in the course of the muscular fibres. The carotid artery, the eighth pair of nerves, and the jugular vein, must be avoided, which, if the section is made with caution, is easily done: the œsophagus, which lies immediately above the air-pipe, being brought into view, may be divided longitudinally, and sufficiently to remove the obstructing matter; it should then be stitched up again with the suture before described, making the stitches very superficial, and leaving the ends of the threads without the wound, which must then be closed, and every means of irritation avoided. For the first twelve hours both drinking and eating must be dispensed with, and this deprivation may be assisted by pouring two or three ounces of laudanum down the œsophagus, which will at once nourish the horse and damp the appetite: a little thick gruel may be given him every twelve hours, but it should not be forced down, as this would endanger the wound. Thirst might probably be altogether prevented by keeping him constantly with wet cloths around his body, by which moisture would be absorbed; and food may be principally supplied by nutritious clysters of broth and gruel, passed as far up the intestines as possible.

In wounds of the *trachea*, no ligature can be applied, as the irritation would occasion a constant cough; the wound itself should also be so managed, that the matter from it may not flow into the opening of the air-pipe; and the access of the external air should likewise be carefully avoided. When the trachea is *purposely* divided, the operation is called *bronchotomy*, in which case a simple opening may be made between the cartilages, and a tube introduced, which must be fastened: no irritation has followed from this; on the contrary, the air has passed freely: but in case it should produce great irritation, it would then be prudent to dissect out a square piece from the trachea itself, leaving it free from the integuments, and without any tube.

WOUNDS OF THE CHEST.

When these take place in the external parts of the chest, as in staking, they must be treated like other wounds of a similar nature; that is, examine the depth, endeavour to remove all extraneous bodies, as pieces of stake, &c., and by no means stuff the cavity with tow, candle, or other substances, keeping in mind the exceptions already noticed. But when wounds penetrate the *cavity* of the chest, they become more complicated, and the proper treatment must depend on the parts injured. When an opening is made into the thoracic cavity, from the air rushing in, the lung on that side collapses, and becomes useless; this, at least, will happen in a great number of instances, but does not always occur; when, however, it does so happen, as the blood can pass through only a part of these organs, there will necessarily follow great accumulation in the right side of the heart, the pulmonary vessels will become turgid, and great inflammation must ensue: therefore, in all cases of this kind, bleed plentifully, endeavour to prevent the blood of the wound from entering or remaining within the cavity of the chest, and the matter likewise; and attempt the extraction of any extraneous bodies that may have entered. When the wound penetrates the lungs themselves, the case is rendered very dangerous from the hæmorrhage, which would in every instance prove immediately fatal, but that the collapse sometimes checks it; it is further rendered dangerous likewise from the inflammation which is apt to supervene. These wounds are distinguished by the air which hisses out at the opening, mixed with frothy *scarlet* blood. Here also the force of the circulation must be restrained by copious bleeding; and if blood becomes effused into the cavity of the chest, it should be suffered to escape by the opening, and if it will not do this, the operation for empyema must be performed. (See *Dropsy of the Chest.*) If emphysematous swellings take place in the parts around the chest, which may be known by the crackling noise and peculiar feel they will be accompanied with; the extravasated air should be let out by small punctures with a lancet.

WOUNDS OF THE ABDOMEN.

When these are external, the treatment must be similar with that of common wounds; but when such an injury penetrates the *cavity*, much danger arises; nevertheless, as the brute resources are much greater, and quadrupeds are more tenacious of life, so those wounds that in the human would kill, a horse frequently survives. When a wound has penetrated the cavity of the abdomen, the extent of it should be carefully examined, that we may learn what viscera are

likely to be injured; in which examination we shall be aided much by a previous knowledge of the different *regions* as already taught, and the viscera that occupy them. If any parts are protruded, carefully replace them; unless they should have become frozen, or mortified, in which case remove the injured and replace the sound part. When the intestines are wounded, the opening in the gut must be neatly sewed up with the glover's suture; and when the opening in the intestine is very large, it is good practice to stitch it to the external wound, when both may heal together, with less danger than occurs from leaving the wounded gut to float loose in the belly. In these cases food should be at first avoided, and little drink given, but nourishing clysters are proper; in which, however, we must be guided by what intestine is wounded. In any case, bleed and use every means to combat irritation and fever. Sometimes, from very large openings made in the abdomen by staking, or from the gores of oxen, follows an extensive protrusion of parts, which must be returned. It will often require much force, and more dexterity to do this: I have placed close to the wound a very firm bandage first, and then have replaced the parts, gradually drawing the bandage onwards as I returned them: the integuments should, in such case, be carefully and firmly sewn up, and a sticking plaister over all, to keep a permanent pressure on the protruding portions. The internal state of the bowels also should be particularly attended to, that they may never be distended; for this purpose, the food should be given frequently, but in small quantities, and very nutritious, as wheat, or malt mashes, with an occasional laxative.

WOUNDS OF THE JOINTS.

THERE are no wounds that, to horses, prove so destructive as these, and the more so, as their treatment has hitherto been grossly injudicious. Most of the parts forming a joint have but little sensibility except under inflammation; but when inflamed they become exquisitely so. When we consider the structure of a joint, it will be found particularly unfavourable for a successful treatment under injury; for the internal surface of the capsular ligament is very vascular, but the external is nearly of the nature of other ligaments and has few vessels; the rest of the parts around likewise are such whose powers are small, and consequently their means of restoration few. Thus, there is a very unequal balance of vascular action in the different parts, and the treatment under injuries becomes therefore very complicated. The joints are subject to several diseases, which are treated on in their proper places; but that we at present mean is a wound by which the cavity is opened, and, as farriers express it, the *joint oil* escapes. By this escape of synovia, the internal surface of the capsule, so extremely sensitive, rubs

against itself, and the highest degree of inflammation ensues; and this is increased by the action of the vessels themselves, which secrete a serous or acrid discharge, instead of the synovia. If such injury happens to any large and important joint, as the hock, the effect on the constitution is such, from the high degree of irritation and symptomatic fever that follows, that death is almost always the consequence. And if the irritation arising from the wound was not of itself sufficient to do this, the treatment usually employed would very certainly produce it: for farriers very commonly, on these occasions, introduce into the cavity some strong stimulant, under the idea of stopping the flow of *joint oil*, which suddenly increases the inflammation to such a degree as speedily to destroy life; or it changes the discharge, and coagulable lymph is thrown out, by which the joint becomes anchylosed; the vessels from each end of the joint shooting into the coagula, and depositing bone: hence it happens, that either death, or permanent lameness, is so frequently the consequence of a wound into the cavity of a large joint. In such cases, nothing whatever should come near the part that can possibly enter; even warm water would inflame, and, therefore, in the attempts to clean these wounds from dirt, the wetted sponge used should not be pressed hard over the opening: infinitely less, therefore, should the farrier's heating mixtures be used. Sometimes the opening into the joint is so small, that an inexperienced observer is not aware of the extent of the injury; but the flow of blood at first, and that of serum afterwards, may be easily distinguished from that of the synovia, or joint oil; which is a peculiarly smooth glib mucus of a yellowish hue, not very unlike the liquid part of the white of an egg, except in colour. When, therefore, this appears, the joint is penetrated; but if not, the capsular cavity is safe.

Treatment.—This must greatly depend on the extent of the wound: if large, and much lacerated, the case is very dangerous; for, either a stiff joint, or death, may be the consequence: the former, if the joint is not a principal one; the latter, if it is the hock, the stifle, and sometimes the knee. In such cases, the lacerated edges must be immediately brought together: if they are not bruised, this may be effected by ligature, but most commonly the injury sustained will prevent this; in which case we must trust to strips of sticking plaister applied with judgment, so as to approximate and close the whole opening if possible: over these strips, apply an adhesive cap that will include and strengthen the whole, and then bandage up so as to prevent any flexion for two or three days.

When a less extensive wound penetrates the cavity of a joint, the opening should be immediately closed; but the common methods of closing wounds are not sufficiently certain here, and a mode less likely to fail than these must be chosen, which is best effected by *firing* the opening with a budding iron; by this the orifice will be immediately closed, and the wound will heal. But the application of the firing iron should only be made to the external

surface of the orifice, for if the inner is touched, the inflammation is apt to be too great; at the same time, however, the external part of the orifice should be sufficiently cauterised, and we may judge when the cautery has done its office by the total stoppage of the oozing. The firing iron should not be too hot; and if any new running of synovia or joint oil appears, as will sometimes be the case, in two or three days time apply it again. I once applied it three several times in this manner, and succeeded at last. Some practitioners attempt the closing of the orifice by caustic, which often likewise succeeds; but the iron is, I think, the best remedy. After the opening is completely closed, a healthy secretion will go on within the joint, and the effects of friction be, by this means, prevented. After this, the fired part should be immediately covered with dry lint, and the whole with a cold poultice of bran moistened with a solution of superacetated lead (*Goulard's water*). Where there has been little appearance of inflammation, but, more particularly, where the opening has again suffered the synovia to escape, I have, as soon as fired, covered the spot with a small pledget of lint of a sixpenny piece size, over which I have placed adhesive strips of plaister instead of the external poultice; and this, when there is any danger that the orifice will again open, is a very proper precaution; for even should inflammation follow, a poultice might be yet put over the whole. Added to these, the general state of the system should be attended to: in a plethoric horse, bleed plentifully, open the body, and place a rowel in any part near the joint that may be convenient. When a high degree of inflammation is present, a blister might be advantageously employed, three inches below the part; but I cannot recommend, as is sometimes practised, to blister *on* the part. Wounds in the hock, it may be observed, are infinitely more dangerous than those in the knee.

WOUNDS OF THE MUCOUS CAPSULES AND THECAL SHEATHS.

By a reference to Bursalogy (*page* 116), and to a description of the Extremities (*pages* 269 *to* 299), it will there be seen that there are existing cavities similar to those of the joints, interposed between, or appropriate to, most of the large flexing and extending tendons. Some of these are sacs situated at the ends of the tendons, and are then called bursæ mucosæ, or mucous capsules, being those parts that, when enlarged, are most erroneously called, by the farriers, windgalls; the nature and situation of which are fully described in *page* 116. Others again are more extended cavities, formed by the sheaths of those flexing or extending tendons that move upon each other. In the fore extremities, they are principally confined to the perforated and perforating flexors of the

pastern and foot, which form the back sinews (*see pages* 271, 281, *and* 284). A very important cavity of this kind is situated behind the knee; another extends down a considerable part of the length of the back sinew; and a third is formed at the back of the pasterns, where the perforating tendon performs the office of the capsular ligament to the joint (*see page* 271).

In the posterior extremities, the first important bursal cavity is at the point of the hock, an opening into which would produce similar effects to that of opening a joint; other bursal sacs exist throughout this important joint (*see pages* 293 *to* 297). Below also, the back sinews present similar thecal cavities between the back sinews: and at the pasterns, both before and behind, the bursal capsules forming windgalls when dilated, all present similar vascular sacs.

All wounds into these thecal and bursal cavities; that is, whenever any of the puffy swellings called windgalls, capulets, thoroughpins, or bog spavin, are penetrated; and likewise whenever an opening is made sufficiently deep to divide the integuments, and penetrate to the back sinews either before or behind, a capsular or circumscribed cavity is laid open, and the most serious effects ensue; for every one of these possess secreting surfaces like the inside of a joint, and form a mucus like synovia to lubricate and assist motion. These are all liable to be wounded from cuts, staking, from the fork in the stable, or innumerable other injuries: and, in such cases, the inexperienced observer is surprised at the immense mischief that follows so *apparently* small an injury. And here, also, the mischief is usually aggravated by the injudicious use of heating applications, which operate in a similar destructive manner to what they do in wounds of the joints.

Treatment.—This differs in no respect whatever from that which is laid down in our description of Wounds of the Joints. These wounded openings must also be closed as soon as possible, and the escape of the secreted mucus prevented. If the wound is lacerated and extensive, or the edges ragged, adhesive strips of sticking plaister, spread on leather or canvas, should be carefully applied so as to draw the divided edges together, and thus to close the cavity; and these should be maintained in their situation till healing has commenced. But when the wound presents a smaller and more circumscribed orifice, carefully apply the budding iron, but not red hot, and treat afterwards as directed under joint wounds.

WOUNDS OF THE ARTERIES.

An intimate knowledge of the course of the large arteries is essentially necessary to every veterinary practitioner, by which he may avoid their division in operations; and likewise that he may, when such an accident does happen, by knowing their course, be enabled to stop a dangerous effusion of blood. Wounds of the ar-

teries, especially of the larger ones, are commonly serious, from the great hæmorrhage that usually accompanies them, and which it becomes necessary immediately to stop, or life is lost; yet in consequence of the great portion of muscular coat to the arteries of the horse, producing a complete contraction, the division of a considerable artery in him will not produce a fatal hæmorrhage: but the division of a very large branch will require the prompt assistance and attention of the surgeon. Hæmorrhages are stopped by the application of styptics; by compression; by firing; or by ligature. *Styptics* are but a delusive term, and have cost, in human surgery, many a valuable life; they act by mixing with the blood, and either form it into a fine paste, as puff ball, flour, cobweb, &c., or they coagulate the blood within the vessels, as alum, vitriol, &c. La Fosse the elder, in 1750, gave a paper to the Royal Academy of Sciences on the virtues of the lycoperdon, or puff ball, in the stoppage of hæmorrhages; but it seems to have been overrated. *Compression* is proper when the vessels cannot be easily got at, and may be made with a bit of sponge or a pledget of any kind pressed immediately on the vessels. The tourniquet is an instrument much in use in human surgery, for effecting compression; but it is not readily applied to the horse, from the superior resistance of parts. In docking, nicking, and sometimes in wounds of the legs, it may be occasionally applied with advantage. *Firing* is proper when an artery or vein remains undivided; in which case the hæmorrhage may be readily stopped by the application of the budding iron to the bleeding orifice. It is also the means in general use in veterinary practice for checking the flow on divided *surfaces:* thus, in docking, nicking, castrating, &c., it is generally resorted to, and is found, by experience, to be the safest. In deep-seated wounds this cannot be put into practice, but the best mode of checking hæmorrhage then, is by ligature. *Ligatures* are made with a needle and thread similar to those we described when speaking of sutures; or they are sometimes applied by an instrument of hook-like shape, called a tenaculum. When the mouth of a vessel can be got at, it is laid hold of by this hook, and drawn sufficiently out to pass a double thread around it; if it cannot be got at in this way, the whole substance near it should be included in a stitch passed through each side and then secured. By a reference to the list of instruments at the end, it will be seen that a great improvement has been made by Mr. Long in ligature needles. If an artery is large, both of the divided ends had better be secured, from the fear of the anastomosing branches; and that next the heart may be very properly secured twice. When a small artery is partially wounded, nothing more is necessary to prevent hæmorrhage than to divide it entirely, when the ends will retract within the edges of the wound.

WOUNDS OF THE VEINS.

When a large vein is divided, it should be secured by a ligature above and below, or the anastomosing branches may continue the bleeding: when smaller veins are divided, the hæmorrhage soon ceases spontaneously. A divided vein will unite, and become again pervious; but an artery will not.

Morbid Consequences of Bloodletting.

There frequently follow very serious consequences from bleeding, which are of two kinds; one shews itself by a simple effusion of blood from the punctured vein into the cellular substance, occasioning inflammation in the parts around; and another where the vein itself takes on inflammation, from a puncture through the opposite coats, or perhaps from causes we are unacquainted with. In the first of these cases there occurs a thrombus or ecchymosis, from the extravasation of the blood into the surrounding cellular substance; originating frequently from an improper mode of closing the orifice. When a horse has been bled, the operator frequently draws the skin much out to introduce the pin, by which means the blood becomes effused: or sometimes the openings between the skin and coats of the vein are not correspondent, which produces the same effect; or they may not be retained in that situation while the blood flows. Whenever this takes place, press the effused blood carefully out with the fingers, and, if the bleeding appears not likely to come on again, put no pin in; or, if one has been introduced, remove it, and let the horse be watched, and his head tied up; and in all cases remove the pin within twenty-four hours, as that alone will irritate frequently. If this effusion should occasion after-inflammation, apply a cold solution of sal ammoniac and vinegar to the part, or a solution of sugar of lead. If the effused blood afterwards should fluctuate, or if matter forms, make a depending opening, or introduce a seton.

Inflamed Vein.

The former case is a simple inflammation of the integuments, from the introduction of a foreign matter, as the effusion of blood within them. This latter is considerably different, and arises from an inflammation of the vein itself; the effect, it is supposed, of the puncture from the fleam or lancet extending to the opposite side of the tube: but there is reason to believe that the vein sometimes takes on this disease without this circumstance. The second or third day after a horse has been bled in these cases, a little tumour may be observed, and the divided edges of the original orifice unclose; and either a little moisture oozes, or sometimes a discharge of blood is renewed, and this several times. If the disease is not attended to in this stage, the tumour increases in size; the vein feels hot and enlarged, and the tumefaction usually extends, either upwards to the

head, or downwards to the chest, and sometimes to both. If the disease is accurately examined at this stage, a large coagulum will be found to have formed within the increased venal diameter. Soon after the mass condenses, or fresh strata are deposited around it, and the trunk becomes impervious: after which all attempts to save the vein fail. As the disease proceeds, ulceration follows, and sinuses form; still the morbid action extends, and sometimes the parotid gland becomes swelled and tender; the whole neck also is stiff and painful, and the animal experiences a difficulty in eating or drinking: at other times the disease proceeds downwards, and inflames the whole course of the vein, till it reaches the heart, when it soon destroys.

Treatment.—We should, in the first instance, direct our efforts to save the vein; for it has followed that, when this is lost, the horse has suffered much inconvenience until the anastomosing branches had enlarged, and could carry the returning blood. When the disease first appears, this may be frequently effected, and the complaint stopped at once, by the application of the budding iron, not too hot, applied to the outer edge of the wounded orifice. It will sometimes be necessary to do this every two or three days for some time; but at last the oozing of blood or moisture will cease. If, however, the tumour increases; or when the complaint is of longer date, other means must be pursued: and when there is no longer any chance of restoring the vein, the best means of cure is to *take it up;* that is, to surround it with a ligature first below or next the heart; and afterwards, if there is room, to do the same above also, between the swelling and the head; the tumour may be then dissected out, or suffered to slough away. This will always succeed if judiciously done: but when the tumour from the swelled vein has proceeded to identify itself with the integuments around, and extensive sinuses have formed; other means must be adopted. In these cases pass small setons through them, or otherwise lay each of them open. When they have not been too deep, or numerous, I have succeeded by injecting them with a tincture of Spanish flies, made with oil of turpentine; or with a solution of white or blue vitriol, or any other mild escharotic. When the swelling extends towards the head, it is prudent to blister the tumefied enlargement of the glands, at the same time that we continue to treat the original tumour. The practice of the farriers in coring out the sinuses with corrosive sublimate is too violent; yet I have sometimes found these ulcers get into such an indolent state, as to require very active means to bring on a healthy action in their sides.

Another morbid consequence of bloodletting arises frequently from injudicious bleeding in the plate or in the thigh vein; in which cases, from the force used, or from an improper part being chosen, the fleam passes through into the fascia which covers the muscles, and over which these veins pass. In these cases the fascia inflames, and a formation of matter or pus takes place within it, which, as it cannot escape, insinuates itself to some depending situation; an

opening should, therefore, be made to evacuate the matter, or a seton may be passed through for this purpose, having first premised fomentations to relax the inflammatory tension. In these cases, if a rowel is inserted into the same limb, it increases the evil; but if in the opposite limb, it is frequently beneficial.

BROKEN KNEES.

Broken knees is a term sufficiently common among horsemen and farriers; and though the *treatment* is referrible to the doctrine of wounds in general, yet many readers will expect some particular directions for these cases. Horses, when they fall, extend their knees forward to save their head; and as the fore parts usually descend with considerable violence, so there happens, very commonly, some laceration of the integuments of the knees. When this extends into the cavity of the joint, which may be known by the extreme lameness and swelling that occurs, as well as by the flowing of a particularly slippery mucus, called *joint oil*, very different from the common matters issuing from a wound; the case must be treated exactly according to the rules so fully detailed under *Wounds of the Joints*. But when there is simple laceration of the integuments only, treat according to the extent of the injury. However, let it be great or small, carefully abstain from the heating applications of the farriers: sufficient inflammation will ensue without the aids, or rather the torments, of turpentine, ardent spirits, and vitriol. Wash the wound with warm water to remove gravel, hair, or other foreign matter; and if the laceration is extensive, or the bruise considerable, apply a saturnine poultice; if not, a simple dressing of any mild ointment will be sufficient. This likewise will be all that is necessary to apply when the inflammation is subdued, and the poultice dispensed with.

But, to prevent or to lessen the blemish consequent on these cases, is often as much a consideration as to heal the wound itself. Three circumstances are desirable; to bring the hair on; to bring it on smooth; and to lessen the scar. Nothing tends so much to *all* these ends, but particularly to leave a small scar, as avoiding heating applications; and, in addition to this, as soon as the part is actually skinned over, apply a mild blister. This absorbs the edges of the scar, and, by removing the old hair, stimulates to a reproduction of new, of one colour, and laying smoothly. Many recipes are given *to make the hair grow*, most of them useless. Nothing acts *specifically* in this way; but whatever gently stimulates the skin, may assist *generally*. Use, therefore, the following:—

Venice turpentine	one dram,
Lard or goose grease	one ounce.

Mix, and rub the part daily.

GUNSHOT WOUNDS.

These wounds present some considerable differences in appearance and effect from other wounds, particularly in their first stages; and though wounded horses are not often much attended to, yet, when circumstances admit of it, by proper treatment many hundred of those might be saved that are generally abandoned; for, even if they should not prove afterwards altogether fit for troopers or chargers, they may make excellent bat or draught horses, which is a matter of great moment in an army. I have been witness to the abandoning of hundreds of wounded horses, that in any other situation than a precarious one, and an enemy's country, or where a blameable indolence prevailed, might have been cured and rendered useful. In consequence of horses not being impressed with anxiety, from the hopelessness of their situation when wounded, it is surprising how little irritability they shew till the constitution becomes affected. I have stood near a horse who has had his hind leg taken off above the hock by a six pound shot, but he has not fell; whereas, in a few seconds after, an officer, who was struck with a spent bullet in the back, that penetrated only through the integuments, was forced some feet by the shock. I have been witness to many similar instances in different actions.

Gunshot wounds are a species of bruise, in which, from the velocity of the ball, the parts become pressed together and lacerated, sometimes in a very peculiar manner. Any one acquainted with these wounds is aware, that nothing but an attentive examination can discover the track of the ball: there is no reasoning upon its probable course from its entry, but what may prove fallacious, since sometimes the slightest substances will turn its path; while at others it penetrates every thing it meets with in its passage: neither can a simple view of a gunshot wound enable us to judge what parts are injured. The laceration and bruising are such in these cases, that there is seldom hæmorrhage at first; but it occurs sometimes unexpectedly in a few days afterwards, when the sloughing takes place: therefore the vessels ought always to be secured when they can be got at, to prevent this, for we cannot keep a tourniquet conveniently on a horse. We must not judge of the extent of the wound by the simple appearance, for the injury may be such as to kill many parts that are not discoloured: this may be particularly remarked in spent ricochet balls. The blackness observable in this kind of wounds does not arise from the balls burning them, nor must the applications be conducted under this supposition.

The complexity of the treatment of gunshot wounds arises from the degree of bruise received, not bearing any comparison with the external wound; from the uncertainty of the direction of the ball; and from the introduction of foreign substances, as the ball itself, harness, clothes, &c. It was formerly deemed so essential to remove

these, that every gunshot wound was dilated and tortured till they were found: the consequence was, that many horses were lost from the irritation unnecessarily occasioned; but it is to be remembered that extraneous substances are a less serious evil than the increase of the original mischief, by too great an enlargement of the wound to hunt for them; yet when it is absolutely necessary to do it, as when the ball can be felt, or when there are large loose masses of harness, or other bodies, whose continuance would irritate, then it should be done at once. And, with the foregoing exceptions, it must be remembered, that, generally speaking, the first thing is to remove the ball and other extraneous matter, and the next to guard against the danger of hæmorrhage. In the sloughing stage we should promote the separation of the living from the dead parts by warm stimulating applications (see *Digestives*, *Mat. Med.*). When suppuration has come on, it should be checked, if too copious, by astringents.

The processes of inflammation, suppuration, and gangrene, have been already fully treated on, and to them I would further refer the practitioner; as whatever occurs in gunshot wounds is equally to be referred to the same laws. It remains only to hint, that as these wounds will usually occur when the animal has already undergone many privations, so a lessened necessity exists for much blood-letting or other evacuations; and also that it is more proper to avoid it when a wound occurs in the neighbourhood of large blood vessels; as, probably, when sloughing commences more bleeding will occur than we wish. The army veterinary surgeon should be supplied with store of opium, and bark, at least of oak bark, for the use of these cases, and every kind of nutriment possible should be got. The treatment of sabre wounds requires no distinction; the rules already laid down apply to both.

Class XII.

Of Ulcers.

WHEN the suppurative inflammation has taken place in a wound or abscess, and granulations do not follow kindly, but the part proceeds slowly towards healing, or remains stationary, or sometimes even increases in size, it is termed *an ulcer*. As in most ulcers there is a morbid action, the cure must depend upon reducing this action, and exciting a new one; the part being then brought to the condition of a simple wound, will heal. In long-continued ulcers the constitution must be attended to as well as the immediate sore: to which end, unless there are symptoms of irritability, purge, and

give diuretics, to afford another determination to the vessels. Rowels are very useful for the same purpose; but where ulcers are accompanied with both local and general irritability, the internal use of opium, with other sedatives and tonics, must not be neglected: the external applications should also be such as give tone. Ulcers are often found of a greater extent internally than externally; and when by this means cavities are formed in different directions, they are called *sinuses* or *pipes*. When there is an external opening with hardened edges, it is said to be *fistulous*. The longer an ulcer has lasted, the more obstinately will the vessels have gained a diseased habit, and the more difficulty there will be to bring them back to a healthy state. The external means employed for this purpose are usually three; injection, seton, or incision. Farriers often treat ulcers very wrongly; for as there are, in most of these cases, sinuses, or pipes as they call them, so they usually *plug* them up, by which the matter formed penetrates farther, bringing into its own action all the neighbouring parts. They likewise dress them so seldom, that the pus frequently takes on a process of decomposition, and becomes acrid; and, lastly, they neglect to gain a depending orifice for these sinuses.

POLE EVIL.

One of the most troublesome *ulcers* we meet with arises from an injury done to the ligaments, integuments, or to the mucous capsules at the junction of the head with the first vertebra, about the insertion and attachment of the cervical ligament, and which, after it has proceeded to an open sore, is called by farriers *pole evil*. It is commonly the effect of accident, as hanging back in the collar, striking the head against the manger or rack, or from blows given, &c. In consequence of its happening to parts whose living powers are not great, it becomes very ill-disposed to heal. It sometimes forms upon the integuments only; at others it is from the first more deeply seated; in either case it usually makes its way on each side of the cervical ligament, passing under that, and leaving it hollow below; sometimes it corrodes the cervical vertebræ.

We should, in every instance, endeavour to prevent the tumour proceeding to suppurate, which, if early discovered, may often be done by astringent applications, as *Goulard water*, *vinegar*, and *crude sal ammoniac*, or the *saline embrocation* (*Mat. Med.*), applied cold, and kept constantly over the parts by means of a wet bandage. But when it inevitably proceeds to suppuration, the formation of matter should be encouraged by fomentations, or by warm poultices, or by the application of an adhesive plaister spread on leather. When the maturation is perfect, which may be known by the soft feel of the tumour, the next indication is to procure a speedy evacuation to the matter, and a depending orifice, that no sinuses may

form; this is best done by the introduction of a seton on each side of the tumour, beginning near the mane, and passing it to the bottom of the abscess; doing the same by the other side, by which means this state of pole evil may usually be speedily cured. But when, from improper management, matter has not only formed, but has been suffered to remain, or has only evacuated itself by a superficial opening, either natural or artificial, and not from one in a depending situation, whereby accumulation has taken place; under these circumstances a healthy secretion of pus ceases, and the parts take on a diseased action; and, instead of healing, the ulcer increases, the discharge becomes thin and ichorous, and sinuses form in every direction.

In such cases we must ascertain the extent and direction of all these sinuses, which, if numerous and small, must be laid into each other by the knife; but if they are large and deep, or there are only one or two, this should be avoided: for very frequently, by an injudicious application of the knife, much mischief is done, and lasting blemishes created. Farriers, for instance, often first open the tumour on the top by a cross incision, by which the skin and the muscular fibres recede, and a large surface is formed, but the matter is not evacuated; and even when it is enlarged at a future time by them, the section is frequently made, not in the direction of the muscular fibres, but across; and it has occurred even that the cervical ligament itself has been divided, to the great injury of the animal. Instead of this, when these sinuses are few and extensive, a seton should be introduced from the original opening through every one of them, and passed out in the most depending situation: the seton tape should every day be touched with liquid blister, or blistering ointment, till the matter from the wound becomes of a good consistence. But in cases of great obstinacy, when this fails to produce a good effect, inject the following:—

Nitrated quicksilver (*lunar caustic*)	one dram,
Water	two ounces.

Dissolve, and, with a pledget of lint, wash the inside of the wound, or inject with a syringe, or try the following:—

Muriated quicksilver (*corrosive sublimate*) .	two drams,
Water	three ounces.

Apply this in the same manner, which will prove nearly or quite as efficacious as the former, and is cheaper.

Humanity requires that all these milder means should be first tried; but unless an evident and decided amendment is quickly apparent, too much time should not be wasted in the use of them, for very frequently cases will occur in which the disease has so completely got possession of the ligamentous parts, perhaps also the bones and the surrounding substances have taken on so permanently the diseased action, that all milder means must fail. In these instances the *scalding mode* of the farriers is found, by experience, to be the

only means that will overcome the morbid action, and produce a healthy inflammation, from which granulations may follow: any of the following formulæ may be used for this purpose:—

No. 1.—Arsenic, very finely powdered . . . . . one dram,
Yellow basilicon . . . . . four ounces.

No. 2.—Corrosive sublimate, very finely powdered . one dram,
Yellow basilicon . . . . . four ounces.

No. 3.—Caustic potash . . . . . one dram,
rubbed down with
Oil of turpentine . . . . . four ounces.

Either of these may be melted to a scalding heat, when, having secured the horse in a favourable position, pour it hot into the cavity, so as to penetrate all the sinuses. A solution of lunar caustic is also a proper escharotic in these cases, or verdigris and tar: but either of the foregoing are excellent, and sufficient for this purpose. In case the outer opening of the pole wound is not sufficient for the sinuses to be readily got at, it must be enlarged. After the *scalding*, wait for the sloughs to separate, which will be three or four days; then dress with any mild ointment; and if, after this, healthy matter shews itself, and granulations arise, a cure will proceed: but if the discharge again becomes ichorous, and the sore looks unhealthy, at the end of a week or ten days from the first scalding, repeat it again as before.

FISTULOUS WITHERS.

When a saddle has continued to press on the withers, by the improper management of an incautious rider for a whole day, and the evil has, perhaps, been repeated the next, the consequence is frequently an inflamed tumour, which should be dispersed in the manner recommended in the former case: but if the heat and swelling remain stationary, we should apply poultices to promote the formation of the matter, and as soon as ripe it is not prudent to wait its bursting, but to open on the affected side in the depending part; or what will, I conceive, be preferable, pass a seton from the top to the bottom of the tumour: if it appears on each side, place a seton on each side. But should the attention be called to a case that has proceeded to a fistulous state, treat exactly in the same manner as with pole evil. Instances have occurred where the matter has penetrated under the blade bone, and made its way to the point of the elbow or shoulder: in these cases a dependent orifice should be made, and the part syringed from above; but it would be impracticable to introduce a seton this length, as well from its extent as from the vicinity of large vessels and nerves. This disease has rendered carious the dorsal spinous processes forming the withers, in which case exfoliation must be encouraged, or healing will not take place.

ULCERS IN THE MOUTH.

THERE sometimes appear small ill-conditioned ulcers in the mouth, approaching to the nature of the thrush in the human: when they are accompanied with any appearances of constitutional affection, they must be considered as symptomatic, and the general disease attended to; but when this does not occur, their removal may be brought about, by touching them lightly with the following:—

Verdigris (*subacetate of copper*)	one dram,
Honey	one ounce.

The *Ulcers* of farcy and glanders, and those arising from grease, are treated of in their proper places.

STRANGLES.

IT is truly remarkable how very contrary the opinions of almost all the writers on this subject have been, and how lamentably ignorant appear their descriptions of it. Mr. Prosser, though he wrote a treatise professedly on the strangles and fevers of horses, in which he introduced some excellent critiques on other writers, yet left both subjects entirely where he found them. Gibson supposed the complaint resembled small-pox; Bracken, the quinsy; others the hooping-cough, measles, small-pox, chicken-pox, &c. All which suppositions originated in a want of attention to the animal economy in general, and to the disease in particular; for it bears no resemblance to either of these, but is a specific fever of horses, accompanied with a disposition to inflammation in the glands of the head and throat.

La Fosse divides it into mild or malignant, and false or bastard strangles: but these definitions do not seem to be well founded, for though there are cases in which the symptoms are milder than others, it does not appear that any specific virus is ever left, by which future depositions are formed, called *vives*. There is no reason to suppose it infectious, though it has been said to have been given by inoculation. A number of horses having it together, is not a proof of its contagious properties, any more than some escaping and others having it, is a proof it is not so.

The disease appears to consist in a specific attack on the parotid and submaxillary glands, more frequently the latter; and which most horses have once during their lives, and once only, generally between the ages of four and six years. But as this specific attack does not render these glands invulnerable to future inflammatory affections from cold or other causes; so, whenever any after swelling

occurs, ignorant farriers suppose it connected with the strangles, which has not, they think, perfectly drained off; and such swelling is called *vives*.

Symptoms.—The strangles usually commences with the general symptoms of catarrh, or, as more familiarly expressed, like a cold and fever: sometimes there is so little symptomatic affection, particularly in mild weather at grass, that the glands gather, burst, and heal, without the matter being hardly noticed. In general cases, however, it does not pass off thus easily, but there is, beside the swellings under the ear, or under the throat, some cough, dulness, and loss of appetite; and it is then frequently mistaken for the epidemic catarrh, or distemper, as it is called: but from this it may be distinguished by the swellings themselves, which are more hot and tender, and more enlarged in strangles than in catarrh. The age of the animal attacked will also usually assist in detecting the strangles; add to which, that in the epidemic, or distemper, the constitutional affection generally runs higher. No great harm, however, can arise in the event of the one complaint being mistaken for the other; for when the febrile symptoms of strangles are considerable, no difference ought to be made in the treatment, except that in strangles we should, to promote an early suppuration in the glands, use warm stimulating poultices; but in catarrh our endeavours would, on the contrary, be directed to discuss and promote a resolution by mild discutients, as hartshorn and oil, vinegar, &c. In all cases of doubt with regard to strangles, warm fomentations only should be used to the swellings, which tend to allay the tension and irritability without materially promoting either the resolution or suppuration. I was formerly an advocate for attempting to repel these tumours by discutients, and lowering the system; but a more extended experience has made me consider, that as the complaint is a specific inflammation of these glands, whose natural cure appears to be a suppurative process; so it is more prudent to promote than to discuss them. It is not, however, absolutely necessary to do this, as I have many times effected their resolution without the complaint ever returning. When the symptomatic affection runs high; that is, when the fever is considerable, there will be sometimes a discharge from the nose before suppuration takes place in the glands: this state, which is nothing more than a pure catarrhal affection, and independent of the existing specific affection, the older farriers call *bastard strangles*.

Treatment.—When the inflammatory symptoms are considerable, treat exactly as directed under catarrh, with this single exception, that the bleeding is not to be pushed, nor even to be attempted at all, unless there is some urgency in the case; but if the pulse is hard and much quickened, with considerable heaving at the flanks; if the extremities are cold, the cough painful, and the nostrils red; then bleed without hesitation. If the throat should be likewise sore, stimulate it; but do not actively blister. Keep constantly to the head a nose bag, with a warm mash frequently renewed; and also, having first rubbed the swellings with an ointment of equal parts of

suet and turpentine, apply a warm poultice, and repeat every twelve hours. Should the hair covering the glandular swellings be very thick, remove it; and particularly observe that the poultice be properly secured, so as not to fall off, nor become detached from the part. The reason for this caution is, that should air get between the poultice and swelling, it would become a source of cold, from the evaporation occasioned, and this would act as a repellent instead of a promoter.

The tumours, having suppurated, sometimes burst inwardly, in which case the future cure must be left principally to nature, and nothing more, in general, will be requisite than mild food, as green meat, if possible, and gentle exercise. But when the tumours point outwardly, as soon as the matter is felt to fluctuate freely, but not before, they may be opened with a lancet, which will tend to shorten the complaint considerably. It is customary to squeeze the abscess violently with the fingers to press out the matter, which is wrong; a very slight pressure for this purpose is proper, but only a slight one; and if the opening should be small, either introduce a pledget smeared with digestive ointment to keep it from closing up, or, what will be better, apply, for a day or two, a poultice. In every other respect the proper treatment is so exactly similar to that prescribed for catarrh, or cold, that we shall pursue the matter no further.

Class XIII.

Of Inflammatory Tumours.

TUMOURS may be divided into such as are accompanied with active inflammation, and those without. Among inflammatory tumours, the most common are the phlegmonous.

Phlegmon is a painful throbbing enlargement, with increased heat. In its incipient state it is generally attempted to be repelled by the various means we have had so many occasions of mentioning; as bleeding, purging, diuretics, with cooling applications to the parts themselves.

Abscess.—When phlegmonous inflammation exists, the vessels become so distended as to rupture, or to voluntarily pour out coagulable lymph, which glues up the sides around the inflamed part; when, from the continuance of the inflammation, the vessels take on another action, and *pus* is formed, but cannot escape. If at this time absorption can be promoted, the matter, if in small quantity, may be removed, and the condensed membrane too, when it is said to terminate by resolution. But if pus continues forming, the cyst becomes distended, which is a stimulus to the healthy lymphatics to

remove the substance next the surface, and the *abscess* is then said to come forward ; to evacuate which we frequently make an opening through the skin, taking care to give the matter the most depending spot for an orifice. Several abscesses, which, in their early state, are tumours, we have described when treating on ulcers, because that is the state in which they shew themselves most troublesome : of this kind are pole evil, fistulous withers, strangles, &c.

Class XIV.

Of Indurated Tumours.

RHEUMATISM.

WHEN I entered on my professional career, I had some doubt whether the horse was ever affected with *rheumatism;* for I was disposed to think what the farriers term *flying lamenesses* were commonly ideal or dependent on other causes : and the cases of this kind, that fell under my own notice, I attributed to very different sources. But since that time conviction has been forced on me by many well-marked cases of a rheumatic nature; and other intelligent practitioners I know have witnessed the same. The French writers all treat on this complaint as common to the horse, and describe it as a painful affection, accompanied with lameness resembling the cramp, and which shifts from place to place. Some of the older farriers meant this malady when they described *chest founder*, which they considered to be an inflammation of the intercostal muscles, and from thence called it *external pleurisy*.

The pectoral muscles, it is certain, become a common seat of the complaint, and of course at this time a considerable stiffness appears on moving : if the affection is long continued, or often repeated, it likewise occasions a lessening and wasting of these muscles. Contraction of the feet, or chronic founder, produces likewise a stiffness in the gait, not very dissimilar to this rheumatic attack : and as here also, when the contraction is of old date, a loss of muscular substance before, is the consequence ; so it has followed as a result, that these two very different maladies have been frequently confounded together, and a foot-foundered horse has been considered as chest-foundered ; much less usual is it for the opposite mistake to be fallen into. Of all the errors of antient and modern farriery, this is, I believe, the most extensive and common, and one that is still adhered to, where veterinary improvements have not shed their light, with un-

usual obstinacy, as is painfully witnessed every year by thousands of patient and unoffending victims: for whenever a horse becomes slowly foundered, under the general inspection of a shoeing smith of the old school, it is the very last supposition that enters his head, that the evil can possibly exist in the part he has had in his lap only a few minutes before, and on which he has just been bestowing the utmost efforts of his ingenuity; he consequently directs his attention other ways: and as his father before him always looked first to the shoulders for any cause of lameness, he, disdaining to be wiser than his progenitor, looks there also; and, perhaps, finding a decrease of size in these parts, is it likely that his faculties of ratiocination should lead him further? The poor beast is, therefore, pronounced *chest foundered*, and is then blistered, rowelled, oiled, and tortured in a thousand ways; but these failing, to complete the catalogue of his sufferings, he is lastly *pegged*. The total confinement required to do all this, increases the contraction of the feet, and the beast escapes further misery by expiating the offences of the operator under the milder treatment of the knacker or collar maker. This forms the eventful history of thousands of horses thus tortured and destroyed by this single error; and I thus enlarge on it purposely to impress it on the memory of the junior practitioner.

By dashing cold water over a horse when hot; by suffering him to stand unusually long without doors; by swimming him; but particularly by riding against a bleak wind; or, in fact, by any undue exposure to cold, a horse is sometimes the next day found to be very stiff, and painfully affected in some of his limbs or in his loins; more generally, however, it affects the muscles of the shoulders and chest, which are, in some cases, slightly tumefied, and tender to the touch. I have witnessed two instances where this complaint took on an acute form, and both were evidently occasioned by cold. In each there were present universal stiffness, great fever, and an evening exacerbation: the cold rigors were strongly marked, and the subsequent heat and sweating as distinct. I bled both largely, opened the bowels, employed extensive embrocatings, inserted rowels in the chest and belly, and gave antimonials internally. One perfectly recovered in ten days, the other in a fortnight. A local rheumatic affection I have many times witnessed, but this universal and acute attack I never have seen since. When this complaint occurs in the loins, it is commonly attributed to strain or blows.

Treatment.—I have treated the *chest founder*, as this complaint is commonly termed, variously, according to circumstances, or agreeably with my views of the matter at the moment. By my notes of practice, I find that, in one instance, I fomented with success; but in this much caution is necessary to rub completely dry afterwards, and to clothe warmly: in another I used stimulating applications, and gave antimonials. In a third, where the stiffness was extreme, I bled in the plate vein, and inserted a rowel into the chest; which practice I was led to by having witnessed, in the former case, a serous

effusion in the cellular membrane of the muscles, which followed the attack, and proved difficult to prevent from proceeding to suppuration; which is not an unfrequent result of these affections, though less frequent with us than with continental horses, where the tumour so formed is termed *anticor*, i. e. *before the heart:* it also receives the same appellation by our farriers. In one instance that fell under my notice, such a gathering followed a very slight rheumatic attack, and in a few months reappeared, apparently then without the rheumatic stimulus: in another, the origin and termination accompanied the exciting affection distinctly. The *proper treatment*, whether its seat is in the loins or chest, will, therefore, consist in stimulating topical applications to the part, warm clothing, rest, and mild food: in case the febrile symptoms are considerable, bleed, and in every instance open the bowels, and give antimonials with nitre.

It remains to remark also, that if the *flying lamenesses* we meet with are most of them rheumatic, which there is great reason to believe the case; then it is common to observe them attack every part of the extremities. I once possessed a valuable horse, which I kept some years, whom I bought with the character of being occasionally lame. He would sometimes work a week or two perfectly sound, and then become lame for two or three days. His feet were excellent, he had no corns, and was wholly without blemish. It could arise from no ligamentary strain, for it was neither better nor worse for work, nor was he lamer when he set off than when he had gone some distance. It appeared to be confined principally to the off shoulder; and it was particularly remarked, that when he returned hot from exercise, and was not immediately attended to, his lameness was sure to come on. Every other practitioner must also have met with instances of lameness returning at uncertain periods, of which the cause is not apparent. The older farriers always attribute these to humours, and, therefore, give physic: and though the cause thus considered is erroneous probably, yet the treatment is, nevertheless, judicious; for I have never found any mode that was so certainly efficacious as this, though I have tried others: nor is this the only instance in which the older methods of cure, founded on long experience, prove the best.

ANTICOR.

This is described as a species of tumour in the integuments of the chest or abdomen, which all the old writers on farriery mention, but most of them without having seen it. It is said to be more common on the Continent, but in England is not often met with. I have seen two instances only; one evidently referrible to rheumatism, the other arose from some cause not apparent.—See *Rheumatism*.

LAMPAS.

YOUNG animals have the rugæ at the roof of the mouth naturally more full than those of older ones: when, therefore, a young horse cannot eat, his mouth is looked into; and because the roof is found more prominent than that of an older horse, he is said to have lampas, and the owner proceeds to cauterize the part. Sometimes, however, a considerable enlargement of them does really occur, in which case by no means cauterize, but apply alum and honey, and if very obstinate, very lightly scarify the parts.

The *real cause* of lampas is generally overlooked; on the contrary, the same occurs here as happens in numerous other instances where the effect only is regarded, but the cause neglected. In almost every one of these cases, unless when the mouth is tender and inflamed from young teeth appearing, the horse will be found more or less out of condition, from fulness of habit, or some stomach affection. The mouth will be hot and dry, perhaps the pulse may be a little quickened, the appetite irregular, and the coat not in the best order. In ourselves we feel an unpleasant roughness, and often a fulness, in the roof of the mouth in fevers; exactly the same occurs here, and most, if not the whole, of these cases may be referred either to some febrile tendency, or to worms, or to some other affection of the alimentary canal. This has been so long regarded by me as the true origin of lampas, that I never now attack the complaint, unless to satisfy the prejudice of the owner of the animal, but through the medium of the stomach.—See *Condition*.

WARBLES.

THESE are tumours that arise in consequence of the pressure of the saddle. If they are in an active state, and the pressure is continued, they suppurate, and form a troublesome sore for some weeks. If they are indolent, and the irritating cause is slightly kept up, coagulable lymph is thrown out, which does not become reabsorbed, and they then form *sitfasts*.

As soon as they are perceived, to prevent these consequences give the horse perfect rest; but if this cannot be granted, let the saddle be properly chambered, and in either case apply a solution of lead, or sal ammoniac and vinegar. When a sitfast is formed, by no means tear it out; but if large and very troublesome, let it be blistered: if this does not remove it, it may be carefully dissected out.

BRUISES.

These are tumours formed by some external injury, wherein the continuity is not interrupted; but a rupture of the smaller vessels occasions an extravasation of blood within. If the injury is small, the parts will reinstate themselves, the extravasated blood become absorbed, and the tumour removed: but, when the injury is violent, the parts may be unable to reinstate themselves; the extravasated blood will then become a source of irritation, and suppuration will follow. Should a still higher degree of violence be offered, the entire tone of the parts becomes destroyed, and sphacelus must take place; when the living parts will make an effort to remove the dead, and an extensive sore will be formed. At other times the blood thrown out, instead of irritating or being absorbed, coagulates, and becomes vascular, when the part remains permanently enlarged.

The *Treatment* of bruises must vary according to these several circumstances. We should always endeavour to reinstate the part, and promote the absorption: this may be done by giving local strength by external applications, as saline matter with vinegar, verjuice, spirits of wine and camphor, &c. If the blood remains fluid, promote its escape by making a small depending orifice. If it suppurates, treat as a common abscess. When sphacelus occurs, treat as under mortification. If the tumour remains indurated, stimulate the absorbents by mercurials, by friction, or by blisters, and, if obstinate, by fire.

MUSCULAR, TENDINOUS, AND LIGAMENTOUS EXTENSION, CALLED STRAINS.

The muscular, the ligamentous, and the tendinous parts, are all liable to extension, if greater force is applied to them than their structure is equal to resist, when of course lameness must follow. These injuries are very various, but with the farriers they all fall under one broad designation of *strain*. It is probable, when such accident occurs to the muscular parts, that there is a lesion of some of the fibrillæ; for their elasticity is too great not to yield to any common extension. Consequently we find that in muscular extensions, from the great vascularity in the part, the symptoms at first are considerable, but the very same vascularity operates to a speedy reinstatement from the effects of the injury.

Very different are these same accidents when they happen to parts purely ligamentous or tendinous, or rather to the thecal sheaths of the tendons, which usually suffer in these cases. It has been common to consider *strains* of these parts as an over-distention of their natural elasticity: but we have reason to believe that their elastic

properties are not considerable, or they would be unfitted for their functions. The muscular fibres possess great dilating and contracting powers; but the tendons, which are but the ropes of the muscles, are nearly, if not wholly, inelastic. Ligaments have the same character, being only connecting mediums; and, except the capsular, have all of them but little vascularity, and few living powers. The same may be remarked of the tendons and their appendages, except of their sheaths, whose inner surface is highly vascular. It is to this inelasticity that strains more especially occur in the limbs; and it is to the small proportion of living powers in these parts that the injury appears at first insidious, but the effects it produces considerable: from this likewise the restoration of the parts is slow, and the recurrence probable. It is also from an erroneous view of the matter on the foregoing grounds, that it has happened that strains have been so wrongly considered by the generality of farriers, and hence often wrongly treated. Having proceeded thus far on the subject generally, we will now enter on an examination of each individual strain, according to the part it affects.

Extension *of the* Shoulder.

A Shoulder Strain, as it is called, is an extension of the muscular or ligamentous parts of the scapula, operating the motions of the shoulder, and serving to connect it with the body; and which parts, it must be evident, are very liable to this kind of injury, from the great extent of motion the omoplate enjoys forward and backward, and its close confinement laterally. *Shoulder strains* are, therefore, frequently the consequences of a side wrench, or slip, which, by separating the fore legs too widely, put these parts on the stretch. The adductor muscles, or the sustaining ones, as the serratus major, must be the sufferers on these occasions; and very frequently also the ligaments of the articulation are principally affected. *Shoulder strains* are rather rare occurrences, much more so than is generally supposed; for farriers and persons about horses are led, from habit, to attribute every lameness they do not exactly understand, and whose seat is not self-evident, to an affection of the shoulder: and when, on viewing a horse in front, the muscles of one or both shoulders appear wasted, it requires more than usual exertion to make even intelligent persons believe that the evil did not originate where its effects are so evident. In all affections of the feet, where there is much pain and lameness, and the animal consequently much at rest, not only the external but the internal muscles of the shoulders waste: this draws the fore legs closer together, the spine of the bladebone becomes prominent, and the whole substance seems lessened. This appears to have two origins; one from inaction, in which muscles always diminish as a necessary consequence; the other proceeds from the pain disturbing the healthy functions of the part.

It is very necessary, therefore, to be able accurately to distinguish a *strain in the shoulder* from the numerous affections with which it is often confounded. In *these cases* the toe is usually dragged along the ground when in motion; and, while at rest, the limb is generally placed forward in a relaxed position, resting on the point of the foot: and this will particularly serve to distinguish it from affections of the feet, in which, though the whole limb may be carried forward and *point*, yet it will be set straight out, and not relaxed; neither will it rest on the toe. These cases are farther characterised, by the extreme difficulty with which a horse moves down the slightest declivity, from the weight being thrown on the shoulders: and, when the ligaments are the principal seat of lameness, the horse, in walking, swings the leg round in a remarkable manner: in fact, he evidently describes the circle of the limb in any direction, but that in which the flexion of the shoulder joint must take a part. And, as a farther mode of ascertaining this affection, if the foot is elevated forward considerably, and the whole limb brought out into a straight line, it will give intense pain if the shoulder be the seat of lameness. It may be remarked, likewise, that shoulder strains almost always happen suddenly.

Treatment.—There is commonly considerable inflammation present, consequently either general or topical bleeding is proper; that is, either draw blood from the neck, or from the plate vein; and if the horse is in full condition, give a dose of physic also: should there be much heat and tension of the parts, bleed in the plate vein, whether general bleeding is tried or not, and foment with hot water two or three times a-day, rubbing dry afterward. But if the heat and tension are not considerable, and the lameness great, insert a rowel into the chest: and, in every variety, enjoin absolute rest. When the inflammatory symptoms have perfectly subsided, the tone of the part must be attended to. If there has been reason to consider it as a ligamentary strain of the shoulder joint, by the heat and tenderness of the point of that part, then, as soon as the inflammation is removed, proceed to blister in the usual manner. But when the evil appears to exist in the muscular parts principally, which is known by the inner side of the arm being tender, I would recommend the following practice, which I have long pursued in these cases with invariable success. This consists in watching the decline of the early inflammation arising from the injury, which decline should be strenuously promoted by the means already laid down. As soon as this is effected, I proceed to raise an artificial inflammation by the free use of stimulants, generally of the liquid blister, in the following manner: Mix six ounces of common oil with two ounces of liquid blister (see *Mat. Med.*), and with this rub the whole affected part every morning, until the swelling and inflammation it will bring on prevent the use of more. In two or three days this will subside, when it should be repeated, until the same effects again prevent the application. In this way keep up a mild inflammation for a week or ten days, according to the original violence of

the affection. In general cases, the subsiding of the second swelling will leave the horse sound. This will be found a much more efficacious mode of practice than the common blister; but it must be particularly remembered, that I know of no affection so liable to return as this; consequently, although the horse may appear sound, it will be very dangerous to put him to immediate work: on the contrary, it will be more prudent to turn him out to grass, if possible alone, or with cows only; otherwise, by playing and galloping with others, he may renew the injury.

Swimming a horse for shoulder strain is a very common remedy among the older farriers, under a supposition that dislocation has taken place; but which practice is founded on an ignorance of the anatomy of the animal, and always proves hurtful. Much less injurious is the old-fashioned mode of *pegging*, which consists in making an opening in the skin of some part of the shoulder, and then, by means of a pipe, blowing in air, exactly as butchers blow up veal. The air thus introduced raises considerable inflammation, after the manner of a blister, and frequently does good.

Blows on the Point of the Shoulder.—These injuries occur more frequently than strains, and are often productive of more present lameness, and consequences eventually more serious. Turning suddenly in a narrow stall, running against a hard body, or being kicked, or violently struck, may any of them occasion it. There will be great tenderness and heat at the point of the shoulder, some swelling, and the lameness will be extreme. In such cases bleed in the plate vein; insert a rowel in the chest; foment the part; and, when the heat and swelling are reduced, blister.

Extension *of the* Flexor Tendons *and their* Sheaths.

Farriers and grooms call this a *clap in the back sinews*, and, when not very violent, is usually confined to the *theca*, or *sheath*, of the flexor tendons; but when the violence has been more considerable, the injury extends to the tendons themselves. It may take place both behind and before, and can be brought on by any thing that acts more strongly on the parts than they are capable of resisting; as, a sudden and violent contraction of the muscles, by endeavouring to recover a false step, or other numerous causes, &c. It is sometimes occasioned by lowering the heels too much and too suddenly, by which unusual weight is thrown on them. In all which cases these parts being incapable of stretching, much violence is done to their structure, and inflammation is the consequence. This inflammation occasions a tension and swelling, and from this, effusion frequently follows, which at first is merely serous, and may be reabsorbed; but if the cause is reapplied, or improper applications are made use of, coagulable lymph may be thrown out between the tendons and their sheaths, which, not being so readily absorbed, remains, and form

the permanent callosities around the back sinews, that so frequently follow these accidents, and which, by obstructing the freedom of motion, occasion a lameness much felt after very hard work, and likewise at first starting; but which, after he has been some time in action, as his attention is drawn off, he feels little of; by the same means, part of the obstructing deposit is also removed; and as horses with old strains go better when they have moved some time, it has induced some persons to hold it as a maxim, that a strained horse may be *worked sound*. It would be as humane and as reasonable to drive the crippled soldier with one leg till the other grew.

The *Treatment of a clap in the back sinews* is to be began by considering it as an inflammation of the sheath of the flexor tendon, usually producing a greater determination to the part, which occasions the tumefaction or swelling, as the increased sensibility is productive of the tenderness. In the first instance, therefore, all the means we have so often recommended for local inflammation ought to be applied; as, local bleeding, saturnine poultices, fomentations; and a relief may be given to the distended parts by elevating the shoe at the heels by calkins, &c. When the inflammation has subsided, the strength and tone of the part must be repaired if possible, which is best effected by mildly stimulating applications, as, spirits of wine and camphor, vinegar, verjuice, stale beer grounds; but, more particularly, by the *saline embrocation* in the *Materia Medica*, applied constantly round the leg by wetting a roller therein. If swelling remains after this, apply a blister. I have treated these cases with great success by pursuing, after the first inflammatory symptoms have subsided, exactly a similar plan of mildly blistering, as detailed in shoulder strain. Sometimes, however, so much weakness will remain, or the enlargement may prove so difficult to remove, as to render it prudent to blister actively. In such a case, first rub the parts before blistering, two or three succeeding days, with mercurial ointment. In still more obstinate cases, fire, and turn out. Hand-rubbing, the use of rollers, or a laced stocking wet with astringent applications, may all be brought in, as aids to prevent a return of the evil.

OVERREACH.

This is usually a blow inflicted on some part of the fore extremity by the hinder one. When it happens that the hinder foot strikes the flexor tendons or back sinews, it produces an inflammation and tumour similar to that last described, and which requires no variety in the treatment.

RUPTURE OF THE SUSPENSORY LIGAMENTS.

Breaking down is the name given by farriers to this accident, and which now and then happens to young horses in breaking, and more frequently to others in training. It has been usually supposed to arise from a rupture of the flexor tendons either before or behind; but they are seldom found affected. The limb, in these cases, betrays the greatest weakness, and the fetlock is brought almost to the ground, but the horse can bend his foot when he raises it; which is not the case when the flexor tendons or back sinews themselves are broken through.

A perfect cure is seldom obtained, but the inflammation should at first be obviated by the former means; the limb should then be elevated, and the heels particularly much raised to relax the parts, when an intermediate substance will be thrown out to unite the divided ends, after which the limb will regain some of its functions. A laced stocking, or firm bandage, is essentially necessary to be used till some degree of strength is gained in the limb. Firing is sometimes useful, as it applies a permanent bandage.

RUPTURE OF THE FLEXOR TENDON, OR BACK SINEW.

This is a very rare occurrence; more frequently the former injury is mistaken for this; but it differs in no respect from that in treatment, except that, in the rupture of the suspensory ligament, the flexion or bending of the limb below the pastern only would be necessary; but here it would be proper to bend the whole limb from the elbow downwards. This could only be effected by slinging the animal, in which case it is probable a very good cure might be effected. A kind of thick leather splent I once saw advantageously applied; but the extreme intelligence and mildness of the animal much facilitated the application.

EXTENSION OF THE LIGAMENTS OF THE FETLOCK JOINT.

A Strain of the Fetlock Joint arises from some injury done to the ligamentous and tendinous connexion of this part, either from long continued exertion or from the effects of more momentary but violent efforts. The effects produced are, swelling and heat in the part, accompanied with great lameness, considerable pain, and

much tenderness. When it occurs behind, it is often mistaken for common swellings arising from want of condition, particularly if the lameness is not considerable. I have frequently seen a slight strain thus mistaken, where the animal has continued to be more actively exercised to take down the enlargement; until the increased inflammation thus occasioned has forced the vessels to deposit coagulable lymph, which, becoming organized, could never be removed, but what is called a *callus* remained ever after. In other instances of similar error, the affection has got worse and worse, till conviction has been forced on the owner by the extreme lameness and misery of the poor beast.

Treatment.—When the heat and swelling shew a considerable injury has been sustained, it is always prudent to immediately give a dose of physic. Confine the horse to absolute rest, and apply, night and morning, a cold Goulard poultice of bran (see *Materia Medica*): and when the heat and swelling are abated, keep a bandage moderately tight around the part, constantly moistened with any mildly stimulating application, as the *saline embrocation* (*Materia Medica*). Should the swelling and lameness not remove from this, proceed to sweat with the *liquid blister*, as directed under that head in the *Materia Medica*. After this, exercise moderately only, still applying the bandage and embrocation when at rest, to prevent recurrence. Sometimes, however, when the injury has been very considerable, it is necessary to blister and turn out to effect a permanent cure.

EXTENSION OF THE LIGAMENTS OF THE COFFIN.

A Strain of the Coffin Joint is not an unusual occurrence; and, like the former, consists of violence applied to the tendinous and ligamentous connexions of this joint. When a horse becomes *suddenly* lame, and no part usually affected in these cases is discovered to be swelled or hot; it is prudent to turn the attention to the feet, and to examine them very minutely. Five times out of six, the lamenesses of horses are situated here; though, by an unfortunate perverseness, a common farrier looks anywhere besides, commonly to the shoulders, which are the least of all likely to be affected; but here he pegs and blisters to the injury of all parties but himself. But, in such a case, on an attentive examination, there will very probably be found in one of the feet, more frequently of the fore, some heat and tenderness, particularly at the back part, towards the upper portions of the heels, and in the hollow of the junction of the little pastern with the coffin. In these strains this part will be always hot, and the horse will express pain when the foot is bent or extended, and he will generally also, though not always, point the foot when in the stable, or, as it is expressed, will stand *favouring*.

Treatment.—If the heat is considerable, put the whole foot into a Goulard poultice for three or four days: in very bad cases I have thinned the whole crust of the hoof, and have drawn blood from the toe. After the heat has in some degree subsided, blister, as a milder treatment will seldom avail here. A fracture of the coffin or navicular bone sometimes also occurs; either of which will produce similar symptoms, but so highly aggravated as to enable the practitioner to form his judgment thereon correctly: add to which, the fractured portions may, by attentive examination, be felt to grate on each other.

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Strain *in the* Joint *of the* Whirl, *or* Round Bone.

As chestfounder covers all the other defects of the fore limbs, so the lamenesses behind are all referred, by the older farriers, to either a strain of the round-bone, or stifle, as their fancy leads them to favour the one or the other. Violence may, however, injure the ligaments of the articulation of the thigh with the pelvis.

The *Treatment*, from the deep situation of the part, must necessarily be attended with some difficulty. It will be proper to foment, or, otherwise, to apply saturnine lotions till the heat is reduced, after which blister actively. It is not improbable that the practice of *pegging*, as performed by older farriers on the shoulder, might here, from the depth of the affection, be a useful stimulant, and may in this case be very properly tried. But, in these instances, the parts sometimes do not readily reinstate themselves, in which case fire over the joint in a star-like form; again blister; apply a charge of pitch and crocus metallorum or minium, and turn out.

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Strain *of the* Stifle Joint.

The ligaments of the patella, and stifle joint, may be strained, or rather injured, by violence, or by blows. As the former affection may be distinguished by a peculiar *dragging* of the limb; this may be known by the *circular direction* in which the leg is carried, during motion, purposely to avoid flexing the joint. The heat and tenderness will also serve to guide the practitioner materially in this instance. Sometimes, the muscles of the thigh, and not the joint, become extended, and produce the lameness; in which case, the tenderness will be found within the groin, and not around the patella or stifle. In treatment, however, this affection in nowise differs from the former, except that sometimes a rowel withinside the thigh has benefited this, but is inapplicable to the other.

Class XV.

Of Encysted Tumours.

VARIX.

A DISEASED enlargement of the coats of the veins is termed *varix*, but which seldom takes place in the venal tubes of the body of the horse, as his superficial order is comparatively small, and not subjected to such artificial pressure as our own. The only instance common in this animal is, that termed *blood spavin;* which is certainly a varicosed enlargement of the superficial vein passing over the inside of the hock; but which is improperly considered as a disease, at least as an original one, being in most instances only the *effect* of another and distinct affection, called *bog spavin*. For its varicosed state is brought on merely from passing over the mucous capsules of the hock, which, becoming enlarged, press on the vein, occasioning an obstruction to the passage of the blood, and a consequent dilatation of its coats. Usually, therefore, the dilated capsule is the part to be attended to; but when the vein becomes so much enlarged as, by its own pressure, to occasion mischief, it can only be remedied by counter-pressure, or by removal. A bandage must be so contrived as to surround and take in the hock generally, but should press on this part particularly, not violently but evenly, having also some astringent assistant application; but should it still remain enlarged, and its existence prove hurtful, which, however, is very seldom the case, then its removal may be effected by including the *vein* above and below the varix with two ligatures. Having done this, the tumour may be opened and the contents evacuated, suffering the remainder to slough away. But it should be remarked that, in five hundred cases of what is called *blood spavin*, it would not, perhaps, in one of them be actually necessary to take up, or *bar* the vein, as a farrier would call it. It is more prudent to attempt the reduction of the dilated bursa, or mucous capsule of the hock, that occasions it; for which purpose blister, or apply a bandage with astringent applications. In bad cases firing proves the best, as it is a *permanent* bandage.

DISEASED ENLARGEMENT OF THE BURSÆ MUCOSÆ,

OR,

Windgalls.

The tendons of those muscles connected to joints have membranous vascular bags attached to their ends, called *bursæ mucosæ*, filled with a mucus to assist the motions of the part. These *mucous capsules* are distributed about all the joints; but, in a *practical* point of view, some are more important than others. The immediate anatomy of these sacs may be learned by referring to *Bursalogy;* and, for an account of individual important *bursa*, see *Description of Anterior and Posterior Extremities*, where each of them is particularly noticed, with a reference to their diseases. It is the morbid enlargement of these mucous bladders that forms the *windgalls* of the farriers; but which is a most erroneous appellation, inasmuch as under any increase of size they never contain a particle of air. Throughout the body, there exists a sympathy between the organs, that brings one kind into action to supply the deficiencies and accidental wants of another kind: thus increased exertions in the tendons produce an increased secretion of this mucus; and this the more, as, by exertion, a greater determination of blood, from which it is secreted, is occasioned; and thus it is, that *windgalls* are almost the invariable attendant on hard work. While they remain small they can do little injury; but, when they become enlarged, they may produce bad effects from the unequal pressure they occasion; which, by stimulating the parts around to throw out coagulable lymph, interrupts their motion; and, also, from a sympathetic effect on themselves, their contents prove not only increased, but diseased, becoming frequently inspissated and thick, by which means the obstruction to motion is still further promoted.

In the Cure of windgalls we must attend to three particulars; the removal of any diseased alteration they may have occasioned in the neighbouring parts; the removal of their distention; and the prevention of its recurrence. Stimulating applications are the most likely to produce a removal of any coagulating deposit: these are likewise still more proper, as they will tend to effect a removal of the contents of the windgall itself. The *liquid blister* of the *Mat. Med.*, applied as there recommended, will be a very proper application of this kind. But simply to promote absorption of the contents of the windgall, continued pressure will be found the most convenient and efficacious method. This may be applied by means of a bandage around the enlargement, in the following manner:— A calico or a flannel roller may be prepared, of two, three, or four yards long, according to the part affected, and size of the horse: four inches is a proper width, and, from its superior elasticity, flannel is preferable to calico or linen. In addition to this, be

furnished with one or two pads, stuffed with horse hair or other elastic matter. Begin to apply the roller, and, after having made a turn or two below the swelling, place the pad exactly upon the windgall; if in the pasterns, one should of course be placed over each side: continue the roller firmly and evenly over all, and fasten off. It will farther assist if either the pad or roller, or both, are first wetted with any astringent application: nor must it be forgotten, that but little benefit can be expected unless this is continued as a constant application for a considerable time, during the day, when not in exercise. I have pursued this plan, and recommended it with singular success, in cases of bad windgalls, both as a cure, and as a prevention to further increase. A run at grass will always remove windgalls; but, on a repetition of the original cause, *hard work*, they are sure to return again: indeed, having once existed, they are peculiarly liable again to re-appear; the dilated bladder seldom regains, with its original size, its original strength. When windgalls are very large, and of long continuance, if the blemish is not objected to, firing is perhaps the most effectual means of relief, and the more, as it removes both cause and effect.

I cannot dismiss the subject without warning the junior practitioner never to be incautiously led to puncture a windgall, under an idea of evacuating its contents; for if even no mischief followed, no good could result: the cyst would be only momentarily emptied; for its capacity must remain the same, and the exhalent arteries would almost immediately fill it up again. Even in this point of view it is quite useless; but, in another, it is worse than useless, being never done with impunity, for inflammation of the most serious kind is sure to follow. Horses have even been destroyed by it; and, when the consequences are not fatal, they are still sufficiently serious, generally ending in anchylosis: and, when by any other means such an accident has happened, the practitioner should immediately close the wound, by the heated budding iron, in the same manner as in an open joint (see *Class* XI). Bursal enlargements, or *windgalls*, bear different technical names, according to their situations, and are particularized immediately following; but, in all, the treatment must be *radically* the same.

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Bog Spavin.

This is only a bursal enlargement of the mucous capsule on the inner side of the hock; and is what usually occasions the dilatation of the vein of that part, forming varix, or *blood spavin*.

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Thorough-Pin

Is the farriers' term for the bursal enlargement situated in the upper and back part of the hock, between the tendons of the great flexor of the foot and those of the gemini; and, as it necessarily shews itself on each side, so it is a *thorough-pin*. From the peculiarity of its situation it seldom occasions lameness, unless very large.

The *Treatment* of this and the former must be the same as that directed for windgalls.

Capulet *or* Capped Hock.

This arises from a swelling of the mucous capsule that surrounds the insertion of the tendon of the gemini muscles into the point of the hock. From its situation interfering with none of the moving parts, it is seldom detrimental. The *Treatment* must be similar to that of windgalls.

The Elbow

Is subject sometimes to a similar enlargement, from a horse sleeping with his legs doubled under him. The *Treatment* of this will correspond with the others. This part is likewise subject to an indurated tumour from the same source, which the French call *couche en vache.*

Class XVI.

Fractures and Dislocations.

WHEN any important bone is fractured in the horse, from the trouble of managing him, the expenses attendant on his keep, and the risk of his future usefulness; attempts are seldom made to *reduce* these fractures, but the animal is usually destroyed. In France, on the contrary, to shew their ingenuity, they attempt the reduction of every broken bone, however difficult. I have now laying before me a treatise written expressly on the treatment of fractures, that have occurred in the practice of the principal French

veterinarians, collected by M. Fromage-Defeugré, sent to me as a complimentary testimony by its ingenious author*. This little work contains not only ample proofs of the ardour and industry of the French veterinarians; but also very excellent directions for the treatment of the fracture of every individual bone liable to meet with this accident in general cases; as, those of the head, the vertebræ, scapula, humerus, canon, and pasterns; likewise the ribs, sternum, pelvis, femur, patella, tibia, canon, &c.

I have ever been of opinion, that we destroy an immense number of horses with fractured bones that might be saved; and, I believe, it was formerly much more the custom than at present, to attempt the cure of most of these. I suspect this subject is but little attended to, even at the Veterinary College; though I agree with the French professor, that there are but few broken bones but what might be again perfectly consolidated by judicious attention; and, particularly, in the event of its happening to a beast of tractable and patient disposition. In some of the fractures of large and important bones, if a horse was even merely turned loose into a large box, extremely well littered up; or, perhaps, supported by bales of hay or straw at his sides, so that the idea of restraint was not excited in his mind, nature would often effect a cure. In other cases he might be slung; and, in almost all, the cure might at least be attempted.

Nature restores fractured bones in the same manner as the soft parts; that is, by inflammation. When a bone is broken, and there is no external wound, it is called *a simple fracture*, in distinction from that producing a wound externally, which is termed *a compound fracture*. In the simple fracture, coagulable lymph is thrown out from the ends of the bones, in which vessels first form, and then deposit ossific matter; this, by consolidating, unites the fractured ends of the bones, and is called the *callus*. But, in compound fracture, the coagula escapes, and the union must be formed by suppuration and granulation; the vessels shooting through which, deposit the ossific matter: thus the same end is brought about, though by a much slower process. In the *Treatment* of fractures, therefore, it is necessary that we assist nature, first, by replacing the divided ends as nearly as possible in their original situation; and, next, that by proper applications we retain them there, till union is effected. It is to be remarked also, that when bones are fractured into numerous fragments, it is often necessary to remove the smaller and useless portions, otherwise the irritation of their sharp ends will occasion an unhealthy inflammation. It is in such cases prudent, when extreme tumefaction shews the existence of these fragments, to cut down on the fracture, and remove

* Traité des Fractures dans les Animaux Domestiques; où l'on Rapporte des Exemples de Fractures Guéries aux Os des diverses Parties du Corps des Animaux, dont un très grand Nombre dans le Cheval, et des Observations sur cette Matière, tirées de la Pratique de plus de soixante Hommes de l'Art. Par M. Fromage-Defeugré.

them, before union will commence. We will now proceed to particularize the several fractures individually.

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Fractured Skull.

This injury may happen from any violence done to the head; it occurs frequently from one horse kicking another. The first thing to be attended to, when a suspicion of this kind is entertained, is that of carefully securing the horse; by which means the nature and extent of the injury may be more readily traced: if any depression of the bones appears, or if there is any doubt relative to it, the scalp should be removed by two cross incisions, when the depressed parts will come into view: those that are loose and detached must be removed, and other portions that are only indented may be raised by any instrument having a firm and safe hold. If this cannot be done without, apply the trepan. When this is effected, the scalp may be drawn together by a stitch or two, but the wound should be by no means exactly closed. No irritating dressings should be applied, but the part simply kept from the external air; and if much blood was not lost when the accident happened, a considerable bleeding should take place from the jugular, to prevent staggers coming on.

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Fracture *of the* Zygomatic Arch.

This bony process is liable to fracture from kicks, blows, &c., in which case the broken portions may interfere with the motion of the jaw, and thus starve the horse. In a case, therefore, of this kind it would be prudent, if the fractured ends could not be replaced through the skin, to make an opening and remove the loose portions; for should coagulable lymph become thrown out extensively, the motion of the coronoid or condoloid processes might be interfered with.

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Fracture *of the* Jaw Bones.

These distressing cases are not unfrequently happening from kicks or other injuries, and the unfortunate animal is almost always destroyed under an apprehension that nothing can be done for him, or that he must inevitably starve. In jaw fractures there is frequently a splintering of the bone into fragments, when, the sharp ends irritating the surrounding parts, a vast tumefaction takes place. In such cases we must not hesitate to open the swelling, and remove any such detached portions. It is true, this reduces

the case to that of a *compound fracture;* but it is, nevertheless, in some instances, absolutely necessary before the remaining parts can be replaced, or a healthy action follow. When it is the posterior or lower jaw that is fractured, it is most fortunate if one branch only is broken: should, however, the injury happen to both, there is still no need to despair. In such case, particularly if the bones are much shattered, both jaws must be actually bandaged together for some time, feeding the horse only by the nose, which is not difficult: but when one side only is fractured, the jaw can be let loose twice or thrice a-day, and the animal suffered to drink and eat, or rather mumble up a mash. In a fracture of the lower jaw, I once succeeded by making a strong leather frame that exactly encased the whole jaw, which I made to adhere by means of pitch.

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Fracture *of the* Nose.

From the brutality of drivers this accident sometimes happens; it is likewise not unfrequently occasioned by kicks from other horses; and I have seen it, on the Continent, extensively fractured from sabre wounds in engagements. Whenever it happens, the bones should be immediately replaced as much in a natural situation as possible, and the external wound carefully closed from the action of the air. In case the fractured parts cannot be replaced by the nostrils, it would be prudent to elevate them by means of an opening made with the trepan: but, in general, the replacement of these bones, when depressed inwardly, as is usually the case, may be effected by means of something introduced up the nostrils wrapped round with tow, linen, or woollen. After which, if necessary, a false nostril of pasteboard, covered with wool or velvet, or one made of stiff leather, &c., might be introduced and kept there.

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Fractured Ribs.

Blacksmiths are apt, from the effect of passion, to strike a horse with their shoeing hammer. I have more than once seen a fractured rib from this cruelty. In other ways, also, the ribs may become fractured. If the end of a fractured rib penetrates the cavity of the chest and wounds the lungs, there is considerable danger that the air will escape, and, being admitted into the cellular membrane, will form emphysema. The proper treatment is, therefore, at the first to apply a bandage to prevent the air insinuating itself, and which will tend also to bring the rib externally into its place, while the action of the lungs will assist it internally. If, notwithstanding, air escapes and enters the skin, which is known by

the distention and crackling feel under the hand, evacuate it by small openings made with a lancet.

FRACTURED BONES OF THE EXTREMITIES.

In *fractures* of the larger bones of the limbs, the horse is almost always killed, as being supposed incurable, or that, if cured, he would be utterly useless: but not only are many of these cases curable, as has been proved, but a horse frequently becomes perfectly useful afterwards; and it is evident that the breed of such an animal at all events, provided it is a mare or stallion, may be made subservient to our purposes.

A fractured Scapula, or shoulder-blade, may be successfully united by slinging, and the judicious application of bandages; but particularly by enveloping the whole part in an adhesive mass, by which some light splents could be attached to the shoulder, and, proceeding downwards, might be fastened around the arm. This plan steadies and supports the limb more than any other. The ingenious French author, already quoted, directs that the whole of the fore parts may be encircled with bandages to keep the injured bones as much as possible in their natural situation. After which, the horse should be gently forced on the opposite side (it would be better to do this first, I should think), and retained there till the cure is effected.

In a case of *Fracture of the Cervix of the Scapula*, the same author informs us a cure was brought about by attaching the lame limb to the well one for forty days. I should suppose that something sufficiently soft and bulky was placed between the fore legs, and that all were then rolled round together: in three months, we are told, the horse walked without lameness.

The *Humerus* is not often fractured. It is very short and thick, and so strong as to be little in danger; but, in such a case, the plan recommended for the cure of the scapula would be here also proper.

The *Cubitus*, or *Arm* as it is called, is more frequently fractured, and may be successfully treated as follows:—Having first slung the horse, reduce the fracture; that is, replace the ends of the divided bones in correct opposition to each other. The animal should be so slung that the feet may just rest on the ground, without taking but little of the weight of the body: fasten each foot in its natural situation; that is, in the situation it would of itself fall. Do this by any ingenious means, as hobbles ringed to the pavement or floor, or four strong boots might firmly be attached to the floor; and each leg, being introduced to its appropriate boot, may be firmly laced in. When all is safe, bandage the fractured limb accurately, by

making the bandage embrace every part, and strengthen the whole with proper splents.

The *Olecranon*, or *Elbow*, has been fractured by violent efforts of the muscles; but the tendinous attachments render it extremely difficult to apply means to retain it in its situation. It is only in a state of absolute relaxation of the limb that any attempt can have a chance of succeeding.

Fractured Canon.—This bone, when fractured, might be managed in a manner similar to the arm. I have seen it, however, treated successfully without slinging, by a stiff frame of leather resembling splents for human fractures, only more extensively applied. In Blount's Farriery there is a plate representing some ingenious machinery for the cure of these cases.

Fractures of the Pasterns and Coffin Bones.—When these occur, particularly the latter, as the accident usually arises from the violent action of its own muscles upon the part, which, of all injuries, is the most severe; so it is very common for the bone to be pulled into several portions, in which cases anchylosis is the usual consequence. In all fractures of this kind, the lameness, tenderness, and feel of the parts, sufficiently distinguish the injury. A bandage carefully applied, and the encouragement of such a situation as will prevent any motion of the part, will insure a junction of the bones.

The *Pelvis*, the *Femur*, and the *Tibia*, are all liable to be fractured; and though the French authors give us reason to hope for a salutary reunion, and likewise directions for the management; yet I never saw a favourable instance, and I doubt the prudence of the attempt; but all the parts below may be most properly attended to in case of fracture, in the same manner as those before.

DISLOCATIONS OF THE JOINTS.

NATURE has so guarded the joints by the great strength of the ligaments and muscles, that luxation seldom happens; and, when it does, counter-extension is the only means by which the bones could be replaced: but, from the immense strength of the muscles, I believe no reduction of a dislocated bone has ever yet taken place in the horse.

Class XVII.

Diseases of the Bones.

Caries, or Mortification.

BONES are subject to inflammation, which terminates, like that of the soft parts, in resolution, suppuration, or in mortification. The living powers of parts are generally proportioned to their vascularity; thus bones, as having but little blood, are weaker; and their actions, both healthy and unhealthy, are slow; from which they do not readily fall into disease, but, when they do, the morbid action generally produces death in them. A loss of the medium by which bones are supported, will also produce mortification: thus, as they receive their support from the vessels of the periosteum, when that becomes torn off, or otherwise destroyed, the bone supplied therefrom dies.

Exfoliation.

When death has taken place in a bone, the process of its removal is called exfoliation, and which process is effected by the absorbents; for the dead bone becomes a stimulus to the absorbing vessels belonging to the living bone with which it is in contact, stimulating them to remove as much of the living as formed an union with the dead; by which means the decayed portion, losing its attachment, comes away. In *caries*, therefore, it must be our endeavour to assist this exfoliation by any means that will further stimulate the absorbents of the living part. Sometimes, from an actual want of power, the caries spreads; in which case we must rouse the living bone into greater action by forcible stimulants; as, oil of turpentine, tincture of myrrh and aloes, brandy, or other spirits: but the most effectual mode is, by the application of the actual cautery, in the form of small heated points applied around the outer edge of the decayed part.

Exostosis.

The bony swellings of horses have various names given to them by farriers; but they have one general character, and most of them

one common proximate cause, which is inflammation. Young horses are more liable to one species of exostosis, and old horses to another; and some are found common to both. Splents, bone spavins, curbs, and ring-bones, are very usually found in young horses; while anchylosis of the back, ossified lateral cartilages, and wolves' teeth, are more frequent in old horses. In young animals the vessels furnishing the bones are in a state of enlargement, because they have not only to replace the absorbed portion, but they have to secrete for the increased growth and solidity. These vessels are more liable, therefore, to be distended upon any exertion, and hence to fall into debility and inflammation, from whence bony deposit is formed: and this will take place in such parts as are most subjected to pressure; as, on the inside of the canon or shank before, and on the inside of the hock behind. In the first they may be occasioned by blows from the opposite foot, or from standing on too great an acclivity in the stable: a very common cause probably arises from reducing the naturally increased height of the inner quarter, which is further done by improperly raising the outer heel of the shoe; from whence a greater proportion of weight is thrown on the inner small metacarpal bone, and which being, by this pressure, in danger of dislocation, occasions bony matter to be thrown out to consolidate its union with the large metacarpal bone or canon, and the matter thus thrown out forms splent. When this takes place in the tarsal bones, or those forming the hock, it becomes bone spavin.

There is another kind of pressure productive of exostosis, which arises from the enlargement of either the ligaments or tendons, by inflammation; that is, when any of the ligaments or any of the tendinous sheaths have been subjected to inflammation, or have been what is termed strained, they may remain permanently thickened, and then, of course, occasion a pressure on the bones below, which in process of time will so stimulate the absorbents, that the bone pressed on will be in part removed by their action: therefore, to repair this loss, a greater deposit is occasioned, but not with the original regularity, and thus exostosis is formed. Bad curbs are instances of this; an incipient curb is usually an affection of the ligaments simply. But it must not be forgotten, however, that the thickening of the ligaments is sometimes the effect of previous exostosis, which, by its rough surface, irritates and inflames them. That species of exostosis which is frequent in old horses, seems more the effect of sympathy than of inflammation; for the absorbents, in the latter periods of life, are in stronger action than the depositing arteries; hence pressure, and perhaps a sense of weakness, easily stimulates them to take up the cartilages of parts particularly exposed to the effects of pressure and exertion; as those of the articulations of the vertebræ, those of the lateral parts of the foot, and some others: the consequence of which will be the deposit of a more solid matter to supply the loss, and hence bone replaces the absorbed cartilage. From this it is

evident, that the common term of ossified cartilage, or ossification of particular cartilages, is not strictly a correct one: a cartilage probably cannot be converted into bone; it may be removed, and bone placed in its room, but the cartilage, there is reason to believe, must be first absorbed. That this action is of a sympathetic kind, is still farther evinced by what takes place when the cartilages are not absorbed, but bony matter is thrown out over them, as is sometimes found to be the case. It is likewise this sympathetic effect that occasions other parts to become ossified; as the large arteries, the trachea, and the internal parts of some glands, by which nature appears to endeavour to renovate the constitution, by consolidating the whole mass, and, thus warring, as it were, against the universal and inevitable decay.

The *Cure* of exostosis must consist in whatever stops the disposition to farther deposit, and removes the effects already produced: how these ends are best brought about, will be seen under the individual diseases occasioned by it.

SPLENT.

Splent is the farriers term for a species of exostosis, situated about some part of the carpal or metacarpal bones; or, in other words, about some part between the knee and pastern; very generally on the inner side. When the situation was attached to the knee itself, the older farriers called it *osselet;* and, when two small bony enlargements were found near each other, they then named them *fuzee.* But when, as is most common, there is one bony tumour at the upper part of the shank, or canon, it is universally known by the name of *splent*, or *splint;* which is a very common evil with young horses, but much less so among the old, for the reasons before given. It is usual to consider the consequences of a splent as principally dependent on its situation, and this is generally correct; but a splent may prove painful, and otherwise injurious, although it should not interfere with any tendon or ligament; for, independent of the increased sensibility of bone itself under inflammation, the periosteum that surrounds it being inelastic, and having no yielding powers, must become stretched. Now, though in a natural state its sensibility is but small, yet, under these circumstances, it proves considerable, and hence is a source of great pain to the animal, till it either becomes absorbed, or has burst. Nevertheless, as the inflammation is seldom very acute, and the increase is generally slow, thereby enabling the periosteum to accommodate itself to the distention; so more generally, when a splent is not situated immediately under a tendon, it occasions but little uneasiness, nor does it often lame. But when it is differently placed, and does interfere with the motion of a tendon, or an important ligament, it is easy to conceive that it must then inevitably occasion pain, and

produce much lameness; for a ligament so pressed on loses its pliancy, and a tendon passing over a splent must necessarily have inflammation excited on the vascular surface of its theca, which, being stimulated to pour out coagulable lymph between its surface and the tendon, must obstruct the tendinous motions, and, by this means, bring on lameness.

The veterinary practitioner should, therefore, in his consideration of the *consequences* in these cases, be guided, in a great measure, by the *situation* of the splent. If placed anteriorly, that is, when it exists at the fore edge of the small metacarpal, or splent bone; it is productive of much less injury than when placed at the posterior edge of the same bone. For, as already pointed out, in this latter case, the swelling will press on the ligaments and tendons of the flexors of the limb, which all occupy this backward situation; and it must therefore, of necessity, raise much inflammation among them. For the same reason also, a splent placed at the lower end of the canon, is still more prejudicial than when situated higher up the leg. All which circumstances are still farther elucidated in pages 39, 92, 284.

It is however necessary to remark, that it is not uncommon to attribute that lameness to a splent which is dependent on other causes; for, as pointed out, a splent does not *often* occasion lameness, except situated as above, or on its first appearance: as, after it has existed some time, the parts become accustomed to its pressure; and this, more particularly, when not placed in a hurtful part, but towards the front of the bone. In cases of splent appearing under these circumstances, therefore, look well to other parts before a decision is made on the probable mischief resulting from the splent itself. It may be added, as a curious fact, that these exostoses usually disappear of themselves, or nearly so, in old horses, although bony formations of other parts are more likely to be formed at these later periods of life. The reason appears to be, that, after the union of the metacarpals is consolidated, the sympathy of *necessity* is lost.

Cure of Splents.—The successful treatment of this evil depends much on its being attended to soon after its first appearance; for where the bony matter has been long deposited, it becomes so hard, and so much a part of the organ itself, that it is difficult to stimulate the absorbents to remove it. When it has long existed, likewise, the ligaments become thickened around it, so that it is almost impossible to act upon the absorbents underneath; and it was probably in such cases as these, that the antient rough treatment of the farriers was found sometimes useful; for, by beating the part with a hammer, inflammation was raised not only within the thickened ligament, but even the texture of the bone underneath was, in some measure, acted on: this violence, therefore, with the assistance of the blister applied after it, in some instances effected that which milder means failed to do, and thus occasioned the absorption of the splent. The older farriers had recourse also to

another very rough mode, which, now and then, also succeeded, but more often caused incurable lamenesses: this was practised by making an opening, when, with a mallet and chisel, the bony swelling was chipped off: but this was a rough and dangerous mode; yet, when a splent forms a very prominent tumour, it might very possibly be laid bare, and removed by means of a very fine saw. This could, however, be proper only under very particular circumstances, as, where the swelling protruded much, and occasioned great blemish: of course, when its situation is among the ligaments, let it be ever so prominent, this must always be improper.

For the *removal of Splents*, I generally proceed in the following manner:—Rub into the swelling, night and morning for five or six days, two drams of mercurial ointment, using a good deal of continued friction with the fingers, to assist its entrance. After the mercurial friction, which I think greatly tends to soften the osseous matter, apply a *mercurial blister* (see *Mat. Med.*): and when the parts are nearly healed, the blister may be again applied, which will farther insure the removal. In very bad cases it is sometimes nesessary to apply the highest stimulus we know, which is the actual cautery or *fire*. In such case, do it in a lozenge form, and immediately blister over it.

BONE SPAVIN.

This is also an exostosis, whose existence is very prejudicial to the value of the horse. It forms usually on the inner side of the hock, either upon the cuneiform tarsal bones, or at the upper extremities of the large and small metatarsals. Both in cause and effect, it presents some differences from the exostosis called splent. It does not appear, like that, so much an effort of nature to prevent *dislocation*, or, in other terms, a *weakening* of the union between the large and small metatarsal bones; neither is it probably often occasioned by unequal pressure from an alteration in the situation of the inner heel. But it appears to arise from an inflammation, first probably originating in the numerous and complex ligaments of the hock, described in the Anatomy of the Extremities. This ligamentary inflammation is produced by violent and long-continued exertions, which weaken their structure, and not only irritate them into diseased action, but also transmits the evil to the bones, and produces exostoses in them. As this osseous inflammation proceeds, an union of some of the tarsal bones takes place, whereby the elasticity of the mechanism of the hock becomes injured, and lameness ensues. The lameness, however, it is probable, is also equally or more the effect of the same circumstances as operate in producing lameness in splent; namely, the painful interference these bony enlargements offer to parts in motion over each other. For

the before-mentioned reasons, as splent is more usual among young horses, so spavin is more frequent among older ones. A spavin, or *jack*, as it is sometimes called, will often lame when outwardly small; but, in such case, the exostosis is probably greater within: and, on the contrary, sometimes a very considerable enlargement produces comparatively little mischief. Unless very deep seated, or very large, the stiffness and lameness occasioned by a spavin go off by exercise, which will serve to distinguish it from other affections; and, even when the lameness remains permanent, still it is much more painful at first than after a little motion. Neither do spavins, when arrived at a certain state, usually increase; consequently spavined horses for some purposes may prove very useful. Post-masters and stage-coach drivers are not however very willing to purchase these, or any others, with permanent lamenesses *behind*, though they do not object to those with founder. The reason of which is, that, in lamenesses *behind*, horses, from instinctive fear, are unwilling to lay down; but, when lame *before*, they are not impressed with this dread; for a horse makes his principal effort to rise from behind. Impelled, therefore, by pain, a foundered horse readily lies down, and these persons find, by experience, that the horse who lies most can work most.

Treatment of Bone Spavin.—This does not differ from that of splent, except that, as it is much oftener a cause of serious lameness, and occurring as it commonly does in older horses, from the effect of long-continued exertion, so it also proves more obstinate; and, therefore, the treatment should be more active. Among the older farriers, very violent means were used for the cure of spavin; such as boring the part with a gimblet; punching with a pointed iron; making a hole and introducing caustic substances, &c. All which have been done to excite absorption; and, though they much oftener ended in anchylosis, or the death of the horse, yet they now and then succeeded. Such cases as these give the practitioner without professional character, a decided advantage over the regular veterinarian; for should the former, by these violent means, destroy his patient, he only stands where he did; but if he cures him, all the world is told that he has effected that which the veterinarian could not do; that is, what he dare not attempt.

Unless a spavin is very early attended to, there exists but little chance of its perfect removal; but if, soon after its first appearance, exactly a similar plan is pursued with that laid down for the cure of splent, it will frequently succeed. When, however, it will not give way to these means, as will not unfrequently prove the case, firing must be resorted to, in the same manner as recommended under the former article, blistering immediately over the firing.

A CURB.

This is described among exostoses, and certainly is sometimes an affection of the os calcis; but, infinitely more frequent it is an inflammatory affection of the ligaments only (see *Anatomy of Posterior Extremities*, page 298), situated posteriorly a few inches below the point of the hock. Its existence is detected by its producing a prominence more or less conspicuous on the otherwise level line of the hock and canon. It usually comes on suddenly from some momentary extension, and is common to young horses. It is not often productive of much lameness, unless it is very considerable, or has been long neglected, though I have seen it very hot, tender, and affect the action considerably. It is sometimes on one leg, and sometimes on both.

The *Cure of Curb* is seldom difficult. If a horse can be spared sufficiently long for the treatment, it may be, in general, radically cured by one blister. In very slight cases, two or three rubbings with the *liquid blister* (see *Mat. Med.*) will sometimes remove a curb: but as the parts require time to reinstate themselves, it being always the effect of strain, so it is generally prudent to go through the regular blister. Firing, though sometimes practised in these cases, is very seldom necessary; unless, from a natural weakness in these parts, the complaint has returned two or three times; in which case it is the best means that can be adopted.

A RING-BONE.

This is usually a bony circle surrounding the whole, or part, of the coronet. Sometimes there are only two lateral swellings; but, although the situation is no further varied than this, in the different cases that occur; yet the parts affected are very dissimilar, and the degrees of lameness by no means the same. In very upright pasterns, either such as are naturally so, or become so from high-contracted heels; the bones are so perpendicularly opposed to each other, that great jar is sustained during motion, and a disposition is excited in the bones to inflammation from these constant shocks. By these means, osseous spiculi are thrown out around the cartilaginous and lower ends of the pastern, in a *bony ring*, which shews itself above the coronet. This kind of ring-bone produces the greatest degree of lameness, and it is this kind which frequently proceeds to anchylose the joint, and render the case hopeless. In other instances, the coronary ligament becomes ossified, in which the lameness is not always very great, though commonly very difficult of cure. But the ring-bones that prove the

least mischievous, are those that are found at the sides of the foot, arising from ossification of the lateral cartilages.

In these several cases the complaint is not difficult to detect, by the hard prominence immediately above the horny circle of the hoof. Ring-bones are sometimes attended with heat, pain, and tenderness; at others, with little; but they always occasion some lameness. Those arising from ossification of the lateral cartilages, are commonly confined to aged or hard-worked horses: those produced by upright pasterns, or other peculiar formation of the parts, are hastened by hard work, but usually appear at the middle periods of life; while the ossification of the coronary ligament seems a constitutional affection, dependent on a disposition to bony matter in these and other parts, and therefore may shew itself at any time. In proof of which, I have seen them in colts of three and four years old.

The *Treatment* I have found most efficacious is the following, for simple blistering will seldom succeed; and even the most judicious management often fails. For four or five days, rub the part night and morning with mercurial ointment; then blister; and, in ten days time, fire in straight or lozenge lines, and re-blister immediately. In firing, avoid wounding the horny quick, or a sandcrack might be the consequence.

ANCHYLOSIS.

A STIFF joint is generally the effect of exostosis, in which bony matter being thrown out from the ends of two articular bones, they become united into one mass. It may be brought on from any cause irritating the cavity of a joint; as the escape of the synovia, a blow, or other injury.

The *Treatment* can only be preventive; in which case blisters and firing might be useful: but, when the anchylosis is formed, no means can recover the cavity of the joint.

Class XVIII.

Diseases of the Eye.

INFLAMMATION OF THE EYE.

Ophthalmia Membranarum.] [*Inflammation de la Conjonctive.*

IT is very remarkable, that though the diseases of the human eye are estimated at more than a hundred, yet there is one only very common to the horse; but which, in obstinacy and ill effects, more than equals all the human catalogue: this is the ophthalmia membranarum, or inflammation of the coats of the eye, by farriers termed *moon blindness*, or *lunatic*. The ophthalmia tarsi finds no place in the diseases of the horse.

The ophthalmia membranarum is a specific and a constitutional inflammation of the eye, and, as such, it requires probably a complete alteration in the constitution for its cure, which will serve to account for the difficulty attending it. The present Professor of the Veterinary College paid a very early and very full attention to this subject; but the result of his researches has only tended to confirm the character of its obstinacy, and of its fatality to the organs it affects. It is remarkable how uninformed the older writers were on this subject; and some of the moderns have little to boast of on this head. The attendant enlargement of the *haw*, which is only the effect of the disease, has been continued to be regarded as at least adding to the complaint, and very often as occasioning it; from which error, many of their writings still contain directions to remove it in these cases. Nor were the former Continental writers much better informed on the subject; their descriptions of the affections of the eye being mostly drawn from treatises on human diseases, and hence they have introduced complaints never met with in the horse. Another erroneous circumstance attending the consideration of this disease, has been the neglecting to regard it as a *specific* affection; on the contrary, farriers and grooms have usually attributed it to the effect of accident, and, therefore, viewed it as simple inflammation: whereas the inflammatory affections consequent to violence seldom produce any ill effect, and in fact are removed very easily. The practice in these cases has likewise been very improper; for it has been supposed that the accompanying *opacity* is brought on by a membranous film, distinct from, and foreign to, the eye; and hence abrading substances have been universally used: but even when they did good, it was not from their *scouring* quality,

but from the stimulus applied to the absorbents, which sometimes by this means removed the coagulable lymph that obstructed the transparency.

The *Symptoms* of the complaint are well known to those conversant with horses, and often make their appearance very suddenly. The eyelids are found swelled, and almost closed, with the haw half drawn over the surface, and the tears flowing down the face usually, in great abundance. There is always great impatience of light, and the eye has a red heavy look: but when there is no increased secretion of the tears, as is sometimes the case, the eye has more of a yellow, than a red hue, with a kind of turbid sediment within the humours. When the affection comes on more slowly, all these symptoms exist in a less degree, and a superficial observer would fail to detect much disease; but these cases are scarcely less formidable than the others. When the inflammation is in a very active state, the vessels surrounding the opaque cornea will be found turgid with red blood, and some of them even protruding red particles into the transparent cornea from the whole circumference; and at all times the dimness in the appearance of the eye is remarkable, for what is termed the colourless part of the blood, is not strictly colourless; but, as it circulates through such extremely fine tubes, it appears to be perfectly transparent. When, however, from this distention of the vessels, the whiter parts of the blood are carried through in larger columns, they lose their perfect transparency, and thus give a degree of dimness to the cornea. In certain states of the complaint the dimness amounts to a perfect opacity, from the deposit of coagulable lymph. This appearance will sometimes take place with astonishing quickness, and its disappearance is as rapid; I have seen it removed in less than twenty-four hours: whereas, with the assistance of the most stimulating applications, it will commonly take several weeks to remove an opacity of the human eye. This has been attributed to the coagulable lymph in the human eye being extravasated; but in the eye of the horse, to its remaining within its vessels; the real cause is, however, dependent on the greater strength of the absorbing system in the latter.

The transparent cornea is but little affected by this disease in man, but in the horse it is always inflamed, and usually very much so. In the human, likewise, this complaint generally attacks both eyes at the same time, but in the horse one only is sometimes affected, and this not unfrequently: but it seldom continues permanently fixed to one, but shifts to the other, leaving the original much amended or nearly well. This complete metastasis has caused it to be compared to a *gouty* affection; and this fully establishes its character as a *specific* disease. It is this shifting of situation also that has given rise to the barbarous custom of putting one eye out, by which means now and then the other has been saved. It has been observed, that the immediate species attended with weeping usually attacks both eyes, but I have seen it confined to one only. It is also asserted, that under ophthalmia a horse rarely sweats, and when he does the

skin is not warm, but cold and clammy: but this is by no means invariable, though experience detects a very considerable sympathetic effect between the eyes and skin in these cases.

The first of these inflammatory attacks however violent, having arrived at its height, usually gives way to medical treatment, or the disease leaves the horse of its own accord, and the eyes recover nearly their former appearance: but they are seldom so perfectly transparent as before; for, on a narrow inspection, there will be observed either some small opaque spots within the pupil, or the general cornea will not be so distinctly clear as before; or even should the centre of the cornea be perfectly transparent, yet there will commonly remain some cloudy lines around its extreme circumference. This should always be particularly attended to, for this is the very last part the opacity quits; and, I believe, in an affected eye, *this* hardly ever wholly leaves the extreme edges. The eye or eyes, however, thus recovered, seldom remain very long sound, but something again calls the diseased action forth, and the complaint recurs with its former violence and its former appearances: but the periods of this recurrence are indeterminate, nor has particular seasons, or particular situations, or the moon, any influence on it; but cold or plethora may hasten it. As these attacks are repeated, they leave the eye less transparent each time; sometimes a very small white speck is left within the humours, which may be seen through the pupil. This opaque spot forms a nucleus for the growth of the future cataract, by gradually increasing: sometimes, however, it will remain stationary a great length of time, and now and then it never enlarges. But in general repeated inflammations succeed to each other, and the whole crystalline lens at last becomes opaque, when the disease takes the name of *cataract*, in which almost all these inflammations terminate. It is remarkable, likewise, when the process of forming cataract is become fixed and regular within the crystalline, that active inflammation usually leaves the coats of the eye, and seldom returns.

Causes.—It has been conjectured, that the *remote* cause of this disease arises from the plethora, which takes place in horses at the adult period; that is, when they have just attained their growth: at which time it is observed they are more frequently first attacked with the complaint; for till this age the blood has not only to nourish the body, but to increase it also by the addition of parts; when, after maturity, having only to support the organs it has already formed, there must be a superabundant quantity of it circulating through the machine: at this period, likewise, the arterial system is in a state of increase generally, and consequently subject to distention. This theory, however, though ingenious, is by no means sufficient to account for the tendency observed to this complaint; for it is by no means confined to the adult period; and even barring this objection to its correctness, it yet remains to be accounted for, why the eyes should be, of all the organs, the only ones attacked? and why also the complaint should be confined to the horse, and not take place in

the mule * and the ass at their adult periods also? We must, therefore, for the present content ourselves by considering it as a constitutional liability, dependent on some peculiarity in the system, which certainly appears to be greater at this period than at any other. At the same time we may indulge a hope, that a more intimate acquaintance with the animal functions, and with the anatomy of the head, may, hereafter, enable us to discover the source from whence these organs draw this liability. The *occasional* causes are probably various. A determination to the head must be the consequence of the exertion which a horse is exposed to when he is first put to active and laborious exercise, particularly that of drawing; and this, as he is unused to it, must considerably act on and distend these parts. Colour has been thought to influence the disease; but there needs no other proof that this is incorrect, than that no two persons agree as to the shade most obnoxious to it; neither is any particular kind of horse more exempted from it than others: but size has certainly some connexion with it, as blindness is much more rare with ponies than with large horses. The acrimonious fumes of a hot foul stable to a young animal, that has been only used to a barn and paddock, may very readily call forth the liability into action likewise: and it is not improbable, as we have before said, that this is a very frequent cause †: though as farmers' horses and others, who are more naturally treated, still are subjected to it; so this cannot wholly account for the disposition. Nor are mules*, asses, and stall-fed cattle, however closely confined, attacked by it. There is no doubt also but accidental plethora at any time predisposes to it; and likewise inflammatory affections of other organs may, by translation, prove a cause: and cold applied in any way frequently calls the disposition into action.

Treatment.—It is not in general found difficult to remove the immediate attack; but from the specific nature of the disease, and the connexion it has with the constitution at large, it is extremely difficult to prevent the recurrence. Common farriers attempt its present removal, and usually go no further. More scientific practitioners mitigate the urgent symptoms, and then attack the cause, through the medium of the constitution at large; though it must be owned in general cases their efforts are attended with very dubious success. The *treatment* should be always commenced by general and copious bloodletting, except in cases of much emaciation, when

* It must be remarked, that though very rarely, yet now and then it has been observed in the mule, but in the ass, I believe, never.

† Does the late prevalence of the Egyptian ophthalmia throw any light on the subject of our present inquiry? The great frequency of the disease in that country is very generally attributed to acrid particles generated by the recession of the Nile; and probably as much also by the acrid burning dust continually flying in the air of that fiery region. If this is the case, the gaseous effluvia, generated by crowded and foul stables, may be a more universal cause of the ophthalmia of the horse than is generally imagined: and, from this error in natural treatment, even farmers and others are not exempt, who, when they do stable their horses, certainly often crowd them, and as often suffer them to stand on foul litter.

it should be confined to topical bleeding only. The general bleeding in a full plethoric horse may also be repeated once or twice afterwards: but when there is no existing plethora, I have not found a frequent repetition of general bleeding advance the cure. Topical evacuation of the blood may be attempted under every state of the body, and may be continued as long as any *active* inflammation exists: but cases will often occur when no benefit appears to result from it. It is common both to practise and to recommend a division of, or a bleeding from, the temporal artery as a remedy; but I have already been at some pains to point out the error of such recommendation, seeing this artery is not distributed to the eye, but is wholly spent on the masseter muscle. (See *Angiology*, page 128; see also *Plate of general Splanchnology, where the distribution of this vessel is particularly and purposely traced.*) Topical bleeding, therefore, can only be effected from the small vein entering the inner canthus of the eye; or by a division of the very fine vessels of the conjunctiva; which, in these cases, may be always seen turgid and full of blood around what is called the white of the eye, as well as within the lids. It requires only moderate dexterity to do this; for if the horse is firmly twitched by the nose, the eyelids being elevated by one hand, with the other these vessels may be readily divided by means of a small scalpel, lancet, or very fine scissars. I have now and then scarified the inner surface of the eyelids in preference, and have sometimes thought I gained more benefit from it. Considerable amendment has also followed the use of setons placed as near the eye as possible. In some instances they have been passed through the under part of the conjunctive coat; but I am not aware that any greater advantage has resulted from this mode, in preference to placing them in the integuments just below the eye. The objection, however, to setons here, is, that they leave a blemish; but by the use of a small seton needle (see *Instruments*) this is rendered very trifling. Rowels under the throat are not liable to this objection, and, as being a much larger drain, probably act with more advantage. I have often tried them with evident benefit; and as they are not likely to be rubbed out by the horse, so, in general cases, they are to be preferred. I have also blistered the cheeks with success; but much caution is requisite to prevent the blistering matter from being rubbed into the eye itself: it may, however, be done in the following manner:—Spread over a piece of stout but pliant leather, the size of the palm of the hand, a thick margin of cobbler's wax, an inch in breadth, which will leave a central part bare; over this place some stiff blister plaister, such as is used for human blisters, which is much firmer than that made by the veterinarian. Apply this, a little warmed, three inches below and behind the eye; afterwards carefully tie the head up to each side, when no danger can occur.

The *external applications* proper in these cases are next to be pointed out; previous to which, however, it must be remarked, that the inflammation present does not, in all instances, bear the same

character; but in some is accompanied with a higher degree of irritability than in others. For in some cases mildly stimulating applications agree best, as vitriolic solutions, tincture of opium, diluted æther, diluted brandy, saline washes, &c.: but at other times, and that more frequently, weak solutions of the superacetate of lead are best borne, and relieve most. In these cases of high irritation, poultices may be applied. I have experienced the utmost benefit from scraped carrots or turnips, and in one instance the common houseleek also was applied in this way: the most common, however, are the saturnine, which may be very properly tried. But, owing to the irritability of the animal, it is often found difficult to retain a poultice: in every case, however, an apparatus of folded linen, wetted with the Goulard water or other wash, may be kept on with ease. Soft linen cloth, several times doubled, may be used for this purpose, fastened to the headstall from the ear of the affected side, as far as the centre of the collar front, hanging from this down the middle of the face over the affected eye, and then secured across by tape. This will have the double advantage, of shielding the eye from light, which is always desirable, and of keeping the medicaments constantly applied. The following formulæ will be found a good one for the early states of the complaint; but, when the irritability is extreme, omit the vinegar:—

No. 1.—Sugar (*superacetate*) of lead . . . . . one dram,
Rose water . . . . . four ounces,
Vinegar . . . . . half an ounce,
Soft water . . . . . a pint.

Internal medicines ought next to occupy our attention. In every instance, if the horse is tolerably full of condition, debar him from corn; instead of which give bran mashes: and, if it can be procured, green meat instead of hay; if not, give carrots, which will support the condition without heating. Every thing that requires active chewing must necessarily force much blood to the head, and, therefore, should be avoided. Some practitioners prefer *diuretics* in these cases; some *purge;* and others trust principally to *alteratives.* I have generally found it beneficial to direct two doses of physic, and to give alteratives in the meantime. And as there are frequent rigors in some cases, and in all, the skin is unthrifty, so warm clothing is advisable: and, as a farther assistant towards a determination to the skin, unite calomel, tartarised antimony, and nitre, as the alterative used. Carefully avoid every source of unhealthy irritation from dung, urine, or stables not ventilated. Exercise, for the first few days, had better be omitted, and afterwards it must not be allowed when the wind is high, or the air cold.

In a week or ten days from the first attack, it may be expected that, *by these means*, the extreme irritation of the affection may have given way, when any of the following formulæ may be then tried; for it may be remarked that, in three cases, all appearing alike, it is not uncommon to find each require a different application. The

prudent veterinarian will, therefore, vary them until the benefit from one shall be evident :—

No. 2.—Sugar (*superacetate*) of lead . . . . one dram,
White vitriol (*sulphate of zinc*) . . . two scruples,
Water . . . . . a pint.

No. 3.—Crude sal ammoniac (*muriate of ammonia*) two drams,
Vinegar . . . . . two ounces,
Infusion of red rose leaves . . . . a pint.

No. 4.—Brandy . . . . . one ounce,
Vinegar . . . . . one ounce,
Tincture of opium . . . . . two drams,
Rose water . . . . . eight ounces.

No. 5.—Ether . . . . . half an ounce,
Infusion of oak bark . . . . . six ounces.

No. 6.—Rose water . . . . . six ounces,
Mindererus's spirit (see *Mat. Med.*) . three ounces.

Introduce any of these, by means of a small piece of sponge or rag, within the inner angle of the eye, gently pressing in a little, which the action of the nictating membrane, or haw, will soon carry over the surface.

Various other applications have been used besides those enumerated, all with dubious *permanent* benefit, but many with present advantage. Among them may be noticed an infusion of deadly nightshade, which, from its wonderful properties of apparently paralyzing the iris, was supposed capable of arresting the inflammatory action: but the event has not justified the expectation. Had it proved otherwise, it would have formed a most convenient application, as it will produce its effects by absorption without actual introduction to the eye; consequently an ointment rubbed on the temple would, in such case, have been sufficient. The cajeput oil has been also tried with some benefit. Gall, common salt, watery solutions of opium, of aloes, and of ground ivy also, have all of them had their advocates.

Other experimental means have been used, as removing the whole or part of the *haw*, or nictating membrane; the violence done to which, and the blood drawn by the operation, have now and then seemed to afford a little benefit; but, as a practice, it is founded in the grossest ignorance and barbarity. The haw is a *necessary* part, and is drawn over the eye, *purposely* to obstruct the rays when the animal can no longer bear the light, and when the entrance of it is really hurtful: but never, in any instance, can it either occasion or add to the disease. Taking up the carotid artery has been likewise tried; but if the practice even cured this complaint, it would, probably, occasion others as bad: neither should any *venal* branch be *divided* instead of punctured, as is sometimes done, except in scarifying; for otherwise, though momentary benefit may be experienced, yet permanent evil must be occasioned.

It remains to notice, that the ophthalmic inflammation is not

always the consequence of the specific or constitutional affection; but may be occasioned also by blows, or other external injuries. In these cases, the proper treatment is, however, exactly the same with that already laid down: but here usually, although the symptoms are at first considerable, yet they more readily yield to a judicious treatment, and the amendment, once began, is regular and progressive, and not subject to the varieties present in the specific affection. It may, therefore, not be improper here to introduce a caution to the veterinarian, that he should always first minutely inspect the insides of the eyelids on these occasions. I have more than once found a hay-seed in the eye; once also a splinter proved the offending cause: and in such cases it would not be creditable to the medical attendant's abilities, to have this discovered by the groom. It should, likewise, be remembered by the veterinary practitioner, that it is always prudent, and often indeed necessary, to ascertain, if possible, whether the disease is really of the true specific kind, or the simple effect of external injury. Various circumstances besides those already pointed out will *assist* him in this respect, though they may not *fully* ensure him; such as the age, the condition, and the other liabilities. For, unless he can ascertain this point, his treatment may be either too little or too much for the occasion; and, at all events, his prognosis of future return must be very open to error.

After the inflammation has subsided, various applications have been made use of to remove the opacity that usually remains. Mechanical friction has been the principal means resorted to, under a presumption that the evil arose from a film or lamen *over* the pupil, which might be rubbed away by abrading and scouring substances, as powdered glass, &c. But this opacity is not confined to the outer surface of the cornea, but pervades its whole substance, so that, when such applications do any good, it is only as they stimulate the absorbents to remove the coagulable lymph, which forms the obstructing matter. This being the case, other substances may be found more efficacious than those that are simply grinding and rough. Calomel I have long used for this purpose, sometimes in conjunction with sugar of lead, at other times alone. This should be introduced by placing a little within the inner angle by the help of the fingers, leaving it to be carried over the eye by the action of the haw: but it is not prudent to blow in the powder by means of a quill, as is frequently done, for it alarms the horse, and is apt to make him shy about the head ever after.

In some instances, when the disease has been thus far removed, I have recommended turning out to grass for a considerable time, and it has seemed as though the constitutional tendency has been removed by it, for it has never returned. In other cases it has again appeared; nor do I think turning out ever proper, so long as the slightest degree of inflammation lasts. I have, on the contrary, seen it hasten the fatal termination into cataract. The other means that have been tried to prevent its recurrence are various: as taking up one carotid; doing the same by the temporal, and likewise the

angular arteries; and as using young horses to draught work has been supposed to increase the tendency, by forcing blood to the head, so such horses have been afterwards used only for the saddle. In one case the recurrence appeared prevented by permitting a horse, who was otherwise constantly in use, to lie without doors every night. Mercurial courses; occasional physic; periodical bleedings; and often repeated alteratives, have all been tried, but too often failed. Nevertheless, it is left to the discretionary judgment of the veterinarian to determine which means to adopt, seeing all have evinced some preventive efficacy.

Ophthalmia *in* Sheep.

Sheep are subject to a species of this complaint, which appears to have nothing of a specific nature in it; but is usually the simple effect of cold. It may be removed in most cases by a wash composed of equal quantities of Mindererus's spirit and water; or by a weak solution of verdigris in vinegar and water.

CATARACT.

This hardly deserves a distinct place among the diseases of the horse, being in him merely the effect and final termination of the former affection; and in this it differs very materially from human cataract, in whom it is really a distinct disease, seldom if ever being brought on by previous *active* inflammation. There is, likewise, in the cataract of horses, independent of the opacity of the lens, generally much derangement of the other internal parts of the eye, particularly of the iris, which sometimes adheres to the lens, at others to the cornea, and in some cases is so contracted as to render the cataract hardly perceptible. This, therefore, prevents any benefit being derived from the operation of couching or extracting in him; add to which, a horse so operated on would be under the necessity, to render the operation useful, to wear glasses ever after. It has, however, been suggested that, even without glasses, so much benefit might be gained from it as to prevent accidents, as running against posts, falling into a pit, &c. This, however, would be greatly overbalanced by the imperfect vision of other objects, and a horse, so operated on, would be sure to become very startlish. If, nevertheless, any person should be disposed to try the effects, the operation of couching is by no means so difficult as imagined, as the eye may be reached and steadied through the great orbitary *fossa*, which must be opened for that purpose.

GUTTA SERENA.

FARRIERS call this complaint *glass eyes*, from the peculiar *glassy* appearance the eyes put on. It is supposed to consist of a paralysis of the optic nerve, and the remedies that have been made use of with success in the human subject seem to justify this idea. By others it is, however, thought to arise from the effects of inflammation, by which coagulable lymph is placed over the optic nerve, thus rendering the retina inaccessible to the stimulus of light. The veterinarian, and, indeed, every one concerned in horses, should make himself familiar with the appearance this complaint puts on, otherwise he may lay open to serious imposition. In these cases a horse presents indications of blindness in his *manner*, though but little in his *eyes*; he seems cautious in stepping, and moves his ears quickly: but, above all, a hand moved close to the eye occasions no winking, unless held close enough for the motion to influence the air around, which an artful person might manage with ease. When this kind of eye is examined closely, the pupil will be found of one *invariable size*, and will not enlarge and diminish as in a healthy horse, when removed farther from, or nearer to, the light. The reason of which is, that the retina, ceasing to be open to the luminous ray, no longer influences the contractions of the iris. It is, therefore, from the peculiarities in the manner of the horse, from the want of motion in the iris, or rather from the invariable size of the pupil; and also from the *greenish cast* in such eyes, that these cases may be distinguished. As it has hitherto proved incurable, we shall waste no time on its treatment.

Class XIX.

Diseases of the Skin.

GREASE.

[*Eaux aux Jambes.*

THIS disease appears to be an inflammation of the secreting capillaries of the lower part of the hind or the fore legs, having something of a *specific* character attached to it. At least we are warranted in concluding it such, from what occurs in cow-pox, which is

a specific affection that may be drawn from this source: but the human ulcerated sore leg would produce no effect on another person, or on any animal; because the inflammation is ordinary, and not specific. The disease appears to have its origin in debility, either general or local. It originates in general debility, when the system at large is debile from long-continued disease; or from want of proper nutriment; or from long-continued exertion: in which cases these parts being farther removed from the source of circulation, which itself labours under *additional* languor, they must suffer proportionally in a greater degree than those more within the sphere of the action of the heart; and hence accumulation takes place, which, if not removed, terminates in grease. This species of general debility appears a natural occurrence in spring and autumn, when horses are moulting or casting their hair, at which times swelled legs are very prevalent.

Grease may be said to have local debility for its cause, when the powers of the system are not properly balanced, as when there is great general vigour, with perhaps increased action from plethora, and likewise little waste to the system by exercise. Fluids press, not in proportion to their diameter, but to the height of their column; hence we can readily suppose that the venous blood must find a difficulty to its ascent. This resistance, at all times considerable, is much increased by circumstances, as size, in a tall long-legged horse; it is also increased in plethoric horses kept without exercise, because, not receiving additional aids from the pressure of the surrounding parts, accumulation takes place; and in a greater degree, when the whole vascular system is in a state of distention: weakness, therefore, is still more certain in those distended vessels remote from the influence of the heart: under all which circumstances the effects we treat of necessarily ensue.

The capillaries of the pasterns likewise become unequal to the exertion of pressing forward the column of blood into the veins, when, to their natural remoteness from the source of circulation, any additional cause is superadded, either of weakness in themselves, or of resistance in the veins. For it must not be supposed that by this mode of reasoning we mean to infer any *original defect* in the parts. Nature formed the balance of power equal, as she made the functions equal; but this balance is kept up in some parts by their own force, and in others by the aid of other powers. Animals, being formed always for a life of nature, have no alteration in structure to accommodate them to a life of art, beyond their natural powers of bearing this change; hence, therefore, though the vessels, at this remove from the heart, must be supposed weaker in individual strength; yet, in a state of nature, they become equal from the support and assistance they derive from surrounding parts, more particularly from the pressure of the neighbouring muscles, tendons, ligaments, and integuments, during exercise; for by this means the capillaries of the skin are pressed upon to throw their blood into the veins, and are themselves likewise acted on and assisted in their

functions by the same aids: a temporary respite is likewise given to them by the blood being forced into the superficial order. By this pressure, during exercise, the cellular membrane also is itself pressed upon to resist accumulation: and, lastly, the absorbents by this means become stimulated to greater action to remove any deposit that may have been formed. This is evident from the effect that takes place upon horses with swelled legs, which enlargements are removed by a few minutes exercise. In a state of nature, horses have these benefits arising from exercise *constantly*, and in due degree; for it is so necessary to their well being, that nature has given them an appetite almost equal in its stimulus to hunger, which is a love of *play*; to gratify which they are compelled to exertion and exercise. This is wisely given strongest in those in whom it is most necessary; in the young to enforce the circulation, that the vessels may be stimulated to their deposit for the growth of parts; and in the lusty and plethoric, that the absorbents may be kept in equal action with the secreting vessels: hence when, perchance, horses might find their food readily and without exertion, if they did not feel a stimulus to exercise by a love of play, they would become too fat, and fall into disease: we, therefore, see them at grass several times in the day race round a field with all the frolicksome sport of children. In the weakened and the old, in whom the absorption is equal, and often greater than the deposit, this would be unnecessary, and they are thus not stimulated by this passion. (See the subject, *Exercise*.) The horse is, therefore, an animal intended by nature for exertion; and, whenever we deprive him of exercise, we prevent the proper balance of power being kept up between different parts of the frame, and hence we must expect disease to take place; and thus it is that, whenever these animals are confined, and at the same time well fed, they almost invariably have swelled legs: and for the same reason it is that within twenty-four hours, horses taken up from grass or a straw yard begin to swell in their legs.

We deviate likewise from a state of nature, when we feed horses overmuch; in these cases a larger quantity of blood is formed, which produces a distention in the vessels in general; and if to this plethoric state, the want of exercise is added, these parts are most likely to suffer from the reasons before given. They will first become distended, the consequence of which will be an inflammatory reaction of the vessels, by which the greasy secretion of the skin of the heels will become diseased; and the parts, that should have thrown out mucus in small quantities, will now pour forth a serous effusion in the form of *cracks*, or a general purulent one under the character of *grease*.

Cold and moisture are likewise circumstances favourable to the generating of this disease. Cold is unfavourable to absorption; it likewise weakens the general energy of the parts, and suspends the circulation; and, when this has happened, on the return of warmth the circulation becomes increased, and the vessels, being weakened,

are rendered incapable of contracting on their contents. Moisture is likewise favourable to accumulation, for it first produces a determination to the parts, and then, as a parent of cold, it weakens the already-distended vessels. This is so true, that, in a regiment of dragoons stationed in America, one officer of which only was favourable to the custom of washing the heels of horses, and which custom he was permitted to exercise on his own troop; the result was, that this individual troop in three months furnished more than twenty greased horses, and the remainder of the regiment not more than two or three: but it is probable that there is nothing immediately detrimental in the simple washing; the evil arises from the legs being permitted to dry without friction, by which means evaporation generates cold.

It has been very ingeniously argued by Mr. Richard Lawrence, that the removing the hair of the heels is a very common cause of grease; but as, whenever accidental wet occurs, this hair must retain a large quantity, and hence be long in drying, occasioning a large evaporation, and thus generating much cold; so it may be doubted whether it is so detrimental. It is seldom, likewise, when there is much hair that the dirt can be effectually removed from the legs; indeed it is too apt to be altogether neglected in such horses; though Mr. L. appears to think that the hair itself prevents the application of either dirt or moisture to the legs. That it may prevent the access of dirt in a degree, I believe; but I think that it does not prevent the access of moisture is evident, by nature having supplied the surface itself with a defence of another kind from the secreted matter; on the contrary it retains it, as may be readily seen when they get once well soaked. Reasoning from analogy, from the resistance that feathers give to wet, is fanciful, but erroneous. The hair appears in a natural state to answer two wise purposes; it keeps the heels warm, which, from their distance from the heart, and from their exposure, require such a covering; it likewise prevents injury to the heels and fetlocks, from stumps and stones, with which, in a state of nature, most parts of the earth is covered: that this is true appears from what we observe in blood horses, who, as being natives of a sandy hot soil, require no defence either from cold or from stones, and hence have no long hair on their fetlocks. That it is even with us a defence from the cold cannot be denied; but, then, the benefit is counterbalanced by the evil of our pemitting these parts to remain in our stables wet, thus generating cold, and applying it to the parts intended to be warmed. And as a defence, except to farmers' horses at plough, or to foresters' horses, it is unnecessary, for our fields are smooth, and our roads are levelled. The hair being suffered to remain, independent of its generating cold when wet, prevents the benefits of friction, by which warmth is produced and absorption promoted; nor are we liable, when the hair is long and thick, to detect the complaints of these parts in their early stages. The *acclivity* of the *stalls* in our stables has been considered as aiding the other causes of grease, and with

some apparent propriety; for it tends to throw considerable weight on the hinder extremities, and, by the unnatural position of the heels, puts the parts on the stretch, and hence weakens them.

The *hinder legs* are much oftener affected with grease than the fore, which their situation sufficiently accounts for: they have less of the influence of the heart, and are forced to depend on their own energy more than the fore extremities, which are much nearer the source of circulation, and thus experience much of its power. To this it may be added, that the hinder legs miss some of the benefits that the fore experience from art; for in many instances, indeed in most, grooms, from a certain fear, rub the hinder legs less than those before: they seldom dare trust themselves on their knees, or seldom employ both hands at once to the hinder extremities; and not only do these parts feel the want of this, but they are also more exposed to cold in the stable, and more liable to the ill effects of moist dung or wet litter.

Thick fleshy-legged horses are peculiarly liable to grease; therefore it is very prevalent among cart and coach horses, particularly of the low heavy breed: but among those that have a mixture of what is termed blood, in whom the cellular membrane is in small quantities, it is little known: hence, as this breed is now more in use than formerly, so grease is not so prevalent among coach horses. Colour, likewise, as it marks debility, so it influences grease; that is, it has been remarked that white-legged horses are more liable to cracks, to grease, and to diseases of the feet, than others, whose legs are dark. That debility is in some measure connected with light coloured hair, is evident from many well known facts. White haired persons are considered as weak in their constitutions; and white animals are more irritably disposed than others, and irritability is usually an attendant on weakness. The hair of children is white, and to which state it returns in old age, for both are states of weakness. The new hair of a lately wounded surface is white, because the part is yet in a state of debility. White hair may be, therefore, considered as a mark of weakness, and which is increased if it is confined to one part, because the balance is more unequal. Experience has, therefore, taught persons to reject white-legged horses; and this has grown into a habit, till they are now thought unfavourable to beauty.

The *Cure of Grease.*—Grease has several stages or states, each of which presents considerable varieties; and, according to the existing state or stage, so will the proper treatment vary. It must likewise vary according to the cause from whence the disease arose. When this affection is accompanied with great general vigour, or originates from plethora, which is the parent of local debility, as we have explained; it often shews itself in the form of cracks, which come on without great previous swelling. But when grease originates in general debility, it frequently first assumes the form of swelled legs. However, these must not be considered as invariable facts, though

sufficiently common. These several states or appearances that grease assumes have different terms, and are apt to be considered as distinct diseases: but the causes producing any one of them may produce the other; and the treatment of all must be grounded on the same principles: nevertheless, for simplicity of reference we shall consider these several states separately, still blending the character of the specific affection and the treatment. Swelled legs without discharge have been already fully considered, with dropsical swellings. See *Class* VIII. See also *Condition*.

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Of Cracks.

As a consequence of general plethora, the capillaries of the heels are subject to have their secretion not only increased, but to have it altered also. At first there will be simply heat and itching in the part; the horse will be observed to rub one leg against the other, and sometimes to stamp with his foot, the whole surface appearing more red than before, but perhaps without *enlargement*. If this state is not attended to, there succeeds an oozing out of a serous discharge from a kind of crack, of which there are sometimes several. Sometimes, though not often, these cracks throw out matter from the first; but, if suffered to proceed, pus always comes from them first or last. In this early state, frequently little more is necessary than a saturnine wash, joined with attention to regular exercise; proportioning the food to the exertion; keeping the parts free from dirt, from moisture, and from permanent cold. But when they occur in a horse of a very full plethoric habit, or in case the cracks shew much virulence and tenderness, then something more is necessary; as a moderate bleeding, with alteratives, and a nightly bran mash; or even one or two doses of physic may be prudent, if the horse should be of a very gross habit. The cracks themselves must be carefully washed with warm water, whenever the horse returns from exercise; after which, bathe with any mild astringent lotion, as the following:—

No. 1.—Sugar (*superacetate*) of lead . . . two drams,
White vitriol (*sulphate of zinc*) . . one dram,
Infusion of oak bark . . . . . a pint.

Mix.

Sometimes the irritability of the parts requires the application of a cooling poultice, previous to the use of the astringent, which will now and then irritate, until the inflammation has been a little appeased by milder applications.

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Swelled Legs *with* Discharge.

When grease has its origin in general debility, as in long-continued illness, impoverishment from scanty feeding, or in particular cases of difficult moulting in the autumn, there is usually in the first instance accumulation within the cellular membrane, as well as a serous discharge from one or more cracks over the general surface of the heels. The curative plan in this case differs from the former, and is more complicated. It should be commenced by lessening the watery deposit; to which end we must diminish the distending column of blood, but not by general bleeding, for that would weaken, and thus increase the disease; but by taking away that part of the blood that can best be spared, by which means we strengthen the distended vessels, without exhausting the system. This we do by very mild diuretics, by remedies determining towards the skin, and sometimes also by mild purges; but the former are more immediately advisable in general debility; because in these cases, particularly by mild diuretics, the watery parts of the blood are, as it were, simply separated; whereas purging appears to be more the increase of a secretion, that answers some necessary purpose in the system, and, as such, the operation calls more of the powers of the constitution forth, without any additional advantage. This appears the proper mode of considering this circumstance generally; but I must not forbear to mention, that I have now and then, even in cases of emaciation, witnessed the good effect of one or two mild doses of physic; the discharge has mended, the horse's carcase has become let down, and other signs of improved condition have appeared.

It was before hinted that cases occur of discharge from the heels, where astringents, immediately applied, only irritate. Every practitioner must have met with such instances, as they are sufficiently common; the cause of which is attributed by farriers to *humour*. Without cavilling about this extensive term, we know that this form of the complaint originates in an irritable and inflammatory state of the vessels, which must be altered before they will suffer themselves to be even gently stimulated by the mildest astringent applications. This irritable state is easily detected by the red sore look of the heels, the ichorous discharge, the tenderness to the touch, and the stiffness on motion; and it is also frequently characterised by the inflammation going on, actually making the heels smoke. This highly irritable state of the vessels can only be reduced by poultices. Sometimes it most readily yields to those made with bran, and wetted with Goulard water: other cases are most benefitted by those made of scraped carrots: others by mashed turnips, previously boiled (see *Poultices*, *Mat. Med.*). By the use of this kind of softening application, the heat, the tenderness, and the redness, will abate: the discharge also from a thin ichorous one will become white, bland, and purulent. At the same time, likewise,

that the poultices are producing this effect on the discharge, the general swelling should be counteracted by alteratives. The following unites the necessary properties :—

No. 2.—Corrosive sublimate (*oxymuriate of quicksilver*) ten grains,
Cream of tartar (*supertartrate of potash*) . . three drams,
Nitre (*nitrate of potash*) . . . . . ditto,
Prepared antimony . . . . . ditto.

Give this every night in a mash, except the complaint takes place in a very emaciated horse; when, instead of the oxymuriate of quicksilver, substitute the same quantity of arsenic. On the contrary, if the patient is of a very full phlethoric habit, add one or two drams of powdered resin to the diuretic, making the whole into a ball instead of a powder; watching, however, the flow of urine, that it does not become inordinate. In some cases, when the expense has not been an object, I have found the following an excellent alterative in cases of grease :—

No. 3.—Æthiops mineral . . . . . half an ounce,
Cream of tartar . . . . . one ounce.

Give every night in a mash. In these cases, also, one or two doses of physic are often useful; and when the parts have been brought into a proper state for the action of astringent applications, wash with No. 1; or, instead, the following may be sprinkled over the sores :—

No. 4.—Powdered oak bark . . . . . one ounce,
Powdered verdigris (*subacetate of copper*) two drams.

Or,

No. 5.—Verdigris . . . . . half an ounce,
Prepared calamine . . . . . an ounce,
Tar . . . . . four ounces.

Mix, and smear the parts lightly night and morning, and after each exercising, having first washed them with warm water. When, also, much tumefaction takes place, united to the use of any of these, a linen bandage is often beneficial; beginning at the coronet, and rolling it more than half way up the leg, being careful that it is only done with a very moderate degree of tightness at first. As amendment proceeds, great care is requisite to prevent relapse, by avoiding the original exciting causes. This will be best effected, in full strong subjects, by long-continued walking exercise, with moderate feeding, particularly by the use of green meat in summer, and of carrots in winter, avoiding much corn, but, in lieu, allowing a sufficient quantity of less heating food, as those kinds already particularised. Bran mashes, as tending to open the body, should not be lost sight of; and when it can be conveniently managed, place the horse in a loose box. But when the complaint occurs in one already emaciated, or weakened from other causes, give only moderate exercise, but let this be compensated by a loose place to live in; feed liberally with green meat in summer, and an occasional

malt mash; and, in winter, give carrots, beet, boiled potatoes, or other food of this kind. I have, in cases where these could not be got, experienced the greatest benefit from spearing the corn, for the use of such horses as were low in their flesh and condition. (See *Materia Medica.*) Any *change* of food, almost, is proper; at least, any not manifestly injudicious. I once observed the best effects follow the substituting of beans for oats, and this in a horse not particularly emaciated; but I had previously remarked, that oats passed away unchanged, which *ground* beans did not do.

Before we quit the subject it may not be improper to remark, that this species of grease is frequently the result of blisters injudiciously applied, when the legs are in a state of swelling and debility; and it may be offered, as a caution to the junior practitioner, that he never attempts a blister, particularly of the hind legs, under such circumstances. For, towards the close of the year, or during winter, or whenever there is a previous determination towards the heels, if blisters are applied without considerable precautions and subsequent care, it will be hardly possible to prevent them from becoming greasy immediately afterwards.

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Confirmed Grease.

This is to be considered only as a more aggravated stage or state of the former; in which case the matter that issues has a fœtid peculiar smell, that strongly characterises the disease; so much so, that a person used to it can at once tell whether a greasy horse is in a stable or not. The inflammation that was before principally confined to the secreting capillaries, now affects the integuments generally, producing extensive ulceration with intermediate dry horny scabs: the hair stands erect; the whole surface becomes exquisitely sensible and vascular, bleeding on the slightest touch; and the vessels of the heels not only secrete pus, but some of them take on a peculiar action, and form horn; so that, in the advanced stages and violent degrees of this complaint, hardened horny knobs form over the fetlock, some of them being vascular, while others are more hard and insensible; and which protuberant portions are called *grapes*, from their figure. The constitution sympathises much with this extreme state of grease, and the horse, unless very well fed, becomes weak, lean, and irritable: good pus or matter is seldom produced, but a peculiar fœtid discharge.

Treatment.—It becomes a question, whether, in a confirmed case, even if it were in our power, how far it would be prudent to stop the discharge at once; for when secreting vessels have been long habituated to any action, they can seldom be suddenly checked with impunity; and in this case also, were the running stopped without previous preparation for the change, it is more than probable that some morbid effects would arise. To commence the *Cure*, there-

fore, of confirmed grease, we must prepare some other parts to take on this action of forming pus. But it is to be first remembered, that the discharge from grease is seldom a healthy one, and it is hence much more difficult to check than one that is simply purulent: therefore, while some other parts are preparing to receive this purulent action, the heels themselves should be subjected to a treatment that may produce a more healthy secretion in them. The best means I have ever witnessed for effecting this, has been a fermenting poultice, made with either barley meal, flour, oatmeal, linseed, or any other farinaceous matter capable of fermenting with yeast. This should be applied every day, as soon as mixed, and suffered to perform all its fermentative process on the leg; when, by the action of the carbonic acid gas, or fixed air let loose, it is remarkable what a change is performed on the part, bringing on, from the most ichorous discharge and irritable state, a mild bland pus-like fluid, with a decrease of irritability. (See the formulæ for these under *Poultices, Mat. Med.*) Should either the trouble or expense of these be objected to, a carrot or turnip poultice may be tried instead, either of which may be applied till it produces a secretion of healthy matter; but it must be remembered, previous to the use of these means, that no ulcer shews a favourable disposition to heal so long as its surface remains above the level of the surrounding healthy parts; therefore it is essentially necessary to the cure, that these sprouting luxurious portions should be reduced even with the surrounding integuments. Caustics only render these *grapes*, as they are termed, more luxurious; but the mode best adapted to their removal is, to scrape off all the horny deposit, and thus level the surface with a very blunt knife; which, when effected, the poultice may be applied as directed.

To prepare the other parts to take on the formation of matter; on the first day of applying the poultice, if the horse is large and tolerably strong, put a rowel in the belly, and introduce a seton on the inner side of each thigh; or place two rowels only, one in each thigh. If the horse is either small or weak, one rowel will be sufficient. In three days the maturating of the rowel and setons will be complete; and, in this time, by the above means, the heels will have taken on a more healthy action: it is now, therefore, that we are to attempt the stoppage of the discharge, which can only be done by the use of the most active of those applications, termed astringents, which will stimulate the parts to take on the adhesive inflammation. For this purpose, either of the following may be tried as a wash, to be used daily, or every other, or every third day, or as often as the irritability of the parts will permit: some cases may require either of these applications strengthened, others weaker than here detailed: try, however, the weaker first:—

No. 6.—Aquafortis (*nitric acid*) . . . . . one ounce,
Water . . . . . eight ounces.

Mix.

No. 7.—Oil of vitriol (*sulphuric acid*) . . . . . one ounce,
Water . . . . . ten ounces.

Mix.

No. 8*.—Corrosive sublimate (*oxymuriate of quicksilver*) three drams,
Spirit of wine or brandy . . . . . one ounce,
Soft water . . . . . ten ounces.

Dissolve the mercury in the spirit by the help of a mortar, then add the water.

No. 9.—Verdigris (*subacetate of copper*) . . . . half an ounce,
Alum (*sulphate of alum* . . . . . ditto,
White vitriol (*sulphate of zinc*) . . . . ditto,
Sugar of lead (*superacetate of lead*) . . . ditto,
Tar . . . . . six ounces.

Mix.

This may be smeared over the parts daily, and will seldom occasion so much irritation as the former; but it is essential to the cure, that a considerable inflammation should be raised; the necessary degree of which must depend on the state of the case, and temperament of the patient.

The *clivers*, or *goose grass*, has been likewise extolled as a remedy for bad grease cases: four ounces of the expressed juice are directed to be given daily, as a drink, and a poultice of the herb, mashed, is to be applied to the heels.

When the discharge has ceased, it will sometimes be found, that coagulable lymph has been thrown out, by which a hardened thickened state of the limb remains; blisters may, in this case, be first tried, to promote the removal, assisted by a run at grass; but should these, as is sometimes the case, fail, the stimulus of firing should be tried. It must likewise be remembered, that this complaint is very liable to recur again; the parts have taken on a habit, which, though removed, they easily assume again, and the secreting surface is likewise increased. This recurrence is also best prevented by firing, for by this means there is a great lessening of secreting surface, by the making an extensive cicatrix or scar; and the limb gains additional strength by the artificial bandage which the firing occasions.

Nothing has hitherto been said on internal medicines, nor on other parts of the treatment as regards food, or exercise; in fact, it will at once strike the judicious reader, that exactly the same rules, and the same cautions, will apply here, as have been detailed when treating on the other states and stages of this complaint. The constitutional tendency to disease must be equally amended by the internal remedies there laid down.

* Mr. White relates two remarkable cases of confirmed and virulent grease, cured by the application of corrosive sublimate in the form of a wash, when other means had failed. I have also often seen it beneficial: the strength of the application should be increased to the full amount that the animal can bear.

MALLENDERS AND SELLENDERS.

[*La Malandre et Solandre.*

When a disease appears on the integuments, exhibiting a scurfy or scabby eruption at the posterior part of the bending of the knee, it is termed *mallenders:* and when a similar one appears at the ply, or bending of the hock in front, it is called *sellenders.* Neither of them lame or do much harm; but sometimes, when neglected, there comes on an ichorous discharge, a little troublesome and always a blemish. Both of them are very easily removed by washing with soap and water, and by applying the following:—

Camphor	one dram,
Sugar of lead (*subacetate of lead*)	half a dram,
Mercurial ointment	one ounce.

Mix.

WARTS

[*Des Porreaux.*

Are best removed by the application of a thread tied round them; or they may be cut off with a knife or scissars, and the root touched with any caustic body. There is sometimes seen a sprouting luxurious species, whose roots are larger than their heads, so that a ligature is not easily passed around them; these are best removed by touching their surface daily with what is by farriers called butter of antimony. In the older books of farriery they are called *anbury*, or *ambury;* and many celebrated recipes for their removal are handed down from one sapient operator to another.

The following application will seldom fail to remove such as cannot be conveniently got at by the knife or ligature, dressing with it once a-day:—

Crude sal ammoniac	two drams,
Powdered savin	one ounce,
Lard	one ounce and a half.

MANGE.

This filthy complaint is too well known to need the detail of many characterising marks; however, it will not be amiss to warn the junior practitioner, that he may sometimes save himself much trouble, and warn his employers of its approach, by attending to circumstances that might otherwise escape his notice. When a horse

has much scurf at the roots of the hairs of the mane and tail, and when he appears pleased to have these parts rubbed; upon looking into them very closely, perhaps some small bare places may be seen: in such case, mange is coming on. Sometimes one or two spots only appear at first, which grow every day larger; at others, a few regular blotches are seen over the fore parts, leaving the skin bare, but without excoriation. It sometimes presents itself under the appearance of what is termed, by farriers, *surfeit:* not but that there is an apparent affection of the skin, under the name of surfeit, that is purely symptomatic of some internal affection, brought on frequently by sudden cold, sometimes from drinking cold water when warm; but which readily gives way to internal remedies only (see *Condition*, page 59). But the surfeit accompanied with hide-bound and bare places, having, in the centre, little pustular risings, is always referrible to a psoric affection, and is commonly a generated kind.

The *Mange* is highly *contagious;* but, in well fed and properly groomed horses, it makes its advances so slow as to exist a long time before it is noticed; so inimical is cleanliness to its formation. The part where the collar presses, the bows of the saddle and pads, the head-stall bearings, &c., will first shew some scurfy marks that would be hardly noticed but for the pleasure the horse expresses when the currycomb or brush passes over them. In badly groomed horses, on the contrary, its progress is more rapid, and the poll, the neck, and roots of the mane and tail, soon become bare, and itch intolerably, so as to make the animal rub them raw for ease. Thus it may be considered as having three distinct origins; one from filth, another from debility, and a third from contagion.

Cure of Mange.—It has been supposed that psoric affections were occasioned by the existence of animalculæ within the skin, which there is no reason to disprove. Whatever is the immediate cause, however, the effects are so filthy and disgusting, as to require the utmost energy immediately to overcome them. In every case of mange not attended with emaciation, but more particularly in that species called blood surfeit, bleed; and if green meat can be got, feed wholly on it, except, as before noticed, great emaciation is present, in which cases give also malt mashes. In winter, allow carrots, beet, or any food of this description; and if these are not to be had, *spear* the corn, and give with bran: for, although not generally taken into the account, a change of food materially assists and expedites the cure. Give also alteratives, as the following:—

No. 1.—Corrosive sublimate (*oxymuriate of quicksilver*) ten grains,
Nitre (*nitrate of potash*) . . . . . four drams,
Cream of tartar (*supertartrate of potash* . . four drams.

Or,

No. 2.—Æthiop's mineral . . . . . half an ounce,
Cream of tartar . . . . . one ounce.

Either of these may be given in a mash every night, observing,

at the same time, in case mercurials are used outwardly also, to watch the mouth. The *external applications* resorted to for the cure are various. I have used all the following formulæ, and can recommend every one of them. The three first are *washes*, and may be applied with a sponge, carefully wetting every affected part. The two latter are *ointments*, sufficiently efficacious, but not so neat as the former: these are also to be applied every morning, accurately rubbing every part.

No. 1.—White hellebore . . . . . two ounces,
Tobacco . . . . . two ounces,
Lime water, strong and fresh made . . . one pint,
Water . . . . . three pints.

Boil the hellebore and tobacco in three pints of water to a quart; when cold, add the lime water. Put the whole into a bottle, and cork it well, pouring it out as wanted.

No. 2.—Corrosive sublimate (*oxymuriate of quicksilver*) one dram,
Spirit of wine or brandy . . . . . one ounce,
Decoction of tobacco . . . . . a pint and a half.

Dissolve the sublimated mercury in the spirit, by rubbing in a mortar, after which add the decoction.

No. 3.—Liver of sulphur . . . . . two ounces,
Decoction of white hellebore . . . . . one pint,
Ditto of tobacco . . . . . ditto.

No. 4.—Finely powdered arsenic . . . . . one dram,
Flowers of sulphur . . . . . six ounces,
Tar . . . . . half a pound,
Train oil . . . . . six ounces.

No. 5.—Sulphur vivum . . . . . eight ounces,
Staves acre, in powder . . . . . one ounce,
Ointment of quicksilver . . . . . two ounces,
Turpentine . . . . . ditto,
Lard, or train oil . . . . . eight ounces.

After the cure is effected, it will be of the utmost consequence that every thing worn by the horse should be carefully washed with soap and water; as, the clothing, halter, and, in fact, every appointment used. The stable utensils, and the stable itself, should be purified also by lime whitening, or washing with pearlash; otherwise the disease may be again taken from these things. It is also necessary that the veterinarian should caution the attendants about mangy animals to be careful of themselves; I have seen the itch taken from a mangy horse more than once: but, as soon as any proper applications are used, little danger is then present; in fact, it ceases with the first dressing.

HIDEBOUND.

I HAVE had many occasions of noticing that this popular term is erroneously applied; and that the *effect* is frequently mistaken for the *cause*. It is very seldom that hidebound exists as a *primary* disease of the skin, but as a *symptomatic* affection it is sufficiently common. It is unnecessary to enlarge farther on it; the introduction of it here is merely intended to keep the systematic order of diseases complete. All that regards the practical consideration is detailed under the article *Condition*, page 59.

Class XX.

Diseases of the Feet.

FOUNDER.

I BELIEVE that every veterinary practitioner at all attached to his profession, has some particular *hobby-horse* in it; that is, that some one particular branch, sometimes one particular disease even, engrosses all his leisure attention. Most unfortunately it often happens that the one chosen is nearly, or perhaps wholly, incurable: the selection of which I should suppose could only arise from the glory of conquering the hitherto unconquered. Mr. Coleman spent much time in combating the *ophthalmia;* Mr. Morecroft, in *forging* of shoes; Mr. White, in experimenting on the *glanders*. Others, that I know, have devoted their attention to the *farcy*. Mr. Bracy Clark's extreme ingenuity has been wasted, I am afraid, in devising a method of *fastening* shoes without the assistance of *nails*. While a new method of *castration* occupies the mind of another, who lives in a neighbourhood where a stallion does not pass once a quarter. My *hobby*, from the beginning of my veterinary pursuits, was the *diseases of the feet*, in general; but that of *founder*, in particular: and though, like my cotemporaries, I may not have advanced as much as I could wish towards a *cure*, I feel confident that, if I could infuse my ideas into the minds of persons connected with the management of horses, the *prevention* of many diseases incident to the feet, but of founder in particular, would be the consequence, and this by no secret method; but, by a simple attention to the subject, on the broad scale of the economy of the animal in

general, and the functions of the parts concerned in particular. I am the more led to this conclusion from the circumstance of my never having had a horse who became diseased in the feet while in my possession; and, although I have purchased a great number who have been faulty in this respect when bought, I do not remember failing to *relieve* every one, so as to render him serviceable to me, and comfortable to himself: and I am much mistaken, if the following observations and directions are properly attended to, whether others will not experience the same benefit.

Founder, as a general subject, is very important; and, when it is considered as probable, that if it does not *destroy*, it at least renders *useless* more horses than all other diseases put together, its importance can hardly be rated too high. To a proper consideration of it, however, it must be regárded as consisting of two kinds, and these essentially differing from each other. The one is an *acute* attack dependent on fever, like the inflammations of any other important organs: the other, a *chronic*, partly dependent on constitutional liability, but much more on outward occasional causes.

ACUTE FOUNDER.

[*Fourboure.*

Of all the definite and well-marked diseases of the horse, this has been most mistaken among the older farriers, and the least noticed among the modern. I do not know a single work on the subject of farriery, that does more than allude to it. I am at a loss to account for this, seeing that, though not a frequent disease, it is yet sufficiently common to have been many times met with by every practitioner who has only a tolerable range of veterinary practice: and, when so met with, it is, both in appearances and effects, too characteristic to be easily passed over without impressing the mind forcibly. Among common farriers, when this disease occurs, it has been very generally mistaken for an affection of the loins or chest; and thus, their applications being made to these parts, it has usually terminated either in the death of the horse, or in incurable lameness. But, *acute founder*, except as being accompanied with symptomatic fever, is confined to the *feet*, and has nothing to do with any other part of the body; but may be defined to be an *active inflammation* of the internal vascular parts of the feet, brought on by a sudden translation of fever to them; or, otherwise, by any of the common causes of topical fever. It may be confined to one foot, to two, or it may attack the whole four; but it is more common to the fore feet, from the weight being more thrown on them in hard riding. The disease usually comes on very rapidly, appearing in a few hours after very hard riding, or driving, with subsequent exposure to cold,

particularly of the feet, as washing them immediately. I once saw it produced by permitting a horse to stand in the snow, after being violently driven. Or it may, perhaps, be sometimes occasioned by first exposing the feet to extreme cold, and then suddenly removing them into a warm stable; the vessels of the feet, not being able to bear this sudden alteration, distend, and fall into inflammation. It is, however, most commonly produced by violent and long continued exercise on hard roads, with subsequent exposure to cold, particularly to the custom of washing the feet and legs of horses when hot. It is no argument against this, that it is done daily to coach and post horses; habit reconciles the most contradictory practices. Nor does the disease, I believe, ever attack a horse without being easily traced to some circumstance wherein heat alternated with cold, or cold with heat, and applied to the feet in particular. A careless rider or driver travels his horse in a cold day, perhaps through the snow, twenty or twenty-five miles in two hours and a half: being thoughtful only of himself, at his baiting place, he delivers his horse to an unfeeling stableman, with—'Here, ostler, take care of my horse; I shall want him in two hours.' In a profuse sweat, the poor animal is taken into the stable to stale, and to have his harness or saddle and bridle taken off, and, within five minutes after, he is again brought out and hung at the door with the bleak air acting on his smoaking carcase; added to which, his feet and legs are deluged with water; and when, from the excess of cold, his perspiration is absorbed, and his skin dry, he is taken in to be fed. Such a horse almost necessarily takes cold. If he had been travelled only six or eight miles, still he would most likely have caught cold, because he had been injudiciously exposed; but then there would have been, perhaps, no preference of parts. That is, in the former case, the long journey, and the quickness of it on a hard road, having heated and tendered the feet—they were the parts most disposed to fail; and the old adage is here made good, that *the weakest must go to the wall.* And, likewise, had the horse travelled slowly, or a moderate distance only, but yet in the *face of the wind,* with after exposure; he would be equally subject to the attack, but then it would have been catarrh, or pneumonia; because the head, neck, and chest had been most exposed. Had the wind blown keenly from behind, and the journey been pursued with but moderate speed, it might then have occasioned rheumatism in the loins, or inflammation of the bowels; or, in fact, whatever part had at that time been accidentally or constitutionally the weakest, would probably have been the object affected. I mean by this to prove, that acute founder comes on like any other topical inflammation, and only operates on the feet, because in an attack of *cold,* under such circumstances as those pointed out, they are the most weakened parts.

Symptoms of Acute Founder.—When a horse labours under this complaint, the attendants are usually unconscious of the real nature of the disease; and it is not unfrequent that even the medical prac-

titioner, when called in, does not immediately detect it, unless much used to these cases: for he finds the horse heaving at his flanks, with a quick labouring pulse; and, on inquiry, he hears that the attack commenced with a rigor or shivering fit; that the suffering animal has been lying down and getting up frequently; groaning with excess of pain, and occasionally breaking out into cold and profuse sweats. In such case, unless he is informed that the horse has been rode or drove with violence, and afterwards exposed to cold; or, unless his eye catches the particular disinclination to remain on his feet, with their extreme heat, he is at a loss, frequently, whether to consider it an attack on the bowels, kidnies, or bladder; or an inflammatory or rheumatic fever. An experienced practitioner will, however, even though called in at first, when the symptoms are not altogether perfectly well marked, still observe that though the horse appears to suffer much pain, and lies down and rises frequently; yet, that he does not attempt to roll, he does not look at his flanks, or kick his belly; and that, although not yet arrived at the height of the complaint, he betrays a peculiar manner of shifting and lifting up his legs; standing likewise particularly, by either drawing his hinder ones much under him to relieve the *fore*, or placing the fore under the chest to relieve the *hinder*, according as one or the other are the principal seat of inflammation; or, by a marked disinclination to remain long up, when the *whole* of them are affected. The practitioner will, however, be commonly saved the trouble of much discriminating; for he will, in general cases, not be called in till the features of the complaint are sufficiently marked, by the utter impossibility to make the horse remain on his legs; on the contrary, when forced up, he lies down again almost immediately, exhibiting every symptom of distress and uneasiness. As soon, likewise, as the complaint has arisen to any height, the feet will be found intensely hot, and the pastern arteries pulsating very strongly: which alone would serve to mark the disease. There is sometimes some little tumefaction around the fetlocks, and when one foot is held up for examination, it gives so much pain to the other, that the horse is in danger of falling. The poor beast groans and breaks out into profuse sweats at one time, and, at others, is cold; his eyes are moist and red, and his whole appearance betokens that he is labouring under a most painful inflammatory affection.

In this state the complaint shews itself the first two, three, or four days; after which its effects are various. In the worst cases, when the symptoms we have stated have raged a few days; a slight separation of the hoof at the coronet may be observed, from which may be pressed a small quantity of reddish ichor or thin matter: the sensible laminæ now losing their connexion with the insensible, by the efforts of the inflammation, the hoofs gradually separate, and, at last, drop off: or, in some cases, mortification at once ensues. At other times, the effects are not quite so violent or rapid; still, however, the termination is sufficiently unfortunate;

for, instead of the death of the parts, or their falling into the suppurative inflammation, coagulable lymph is thrown out, which equally forces off the hoofs; but not until some time after, and not until the parts underneath have acquired some solidity; nor, indeed, till the germ of a new hoof appears, but which, if suffered to grow, never proves perfect: on the contrary, the horse usually remains permanently lame. I have likewise seen instances where coagulable lymph has been thrown out between the laminæ and under the coffin bone; the inflammation, however, not being sufficiently active to force off the hoofs, they have remained; but still have gradually become imperfect and deformed. This imperfect resolution may be known, before its effects on the horn become apparent, by the very peculiar gait the horse exhibits when taken out, and which, once seen, can never be forgotten: for he throws his feet forward in a seemingly burlesque manner, and brings them down as oddly on the heel. In fact, he clearly shews that he has lost the proper sensibility of his feet. In other cases again of imperfect resolution, the laminæ losing their elasticity and power, yield to the weight and stress of the coffin bone, which becomes pushed backwards, and, in its passage, draws with it the anterior crust of the hoof, which thus falls in; the pressure also of the coffin bone destroys the concavity of the horny sole, which, instead, becomes convex or pumiced, leaving a large space towards the toe filled with a semi-cartilaginous mass; and this is not an unfrequent termination of founder.

But when the attack is not commenced with the extreme violence we have detailed, or when an early and judicious treatment has been adopted, the resolution of the inflammation will often be perfect. The horse will first sweat and groan less: some inclination to eat will be observed, the pulse will moderate, and he will stand up longer. These favourable appearances will increase daily, and, in the end, the animal will recover the perfect use of his feet.

Treatment.—As soon as the disease is discovered bleed largely, as four, five, or six quarts, according to size and condition; back-rake, and throw up clysters: but, unless there is actual costiveness, do not give physic, as it would be inconvenient to the horse to rise to relieve himself; neither is it proper, on account of the extreme fever present: but febrifuge medicines should be given, as the following, twice a-day in a pint of warm water:—

Emetic tartar (*tartarised antimony*) . .	two drams,
Nitre (*tartrate of potash*)	four drams,
Cream of tartar (*supertartrate of potash*)	ditto.

The feet themselves should be next attended to after the bleeding. In the first place remove the shoes, and rasp the feet round as thin as is prudent, which will greatly relieve the pressure of the horn on the internal swollen tender parts. As each foot is rasped, let it be also bled from the toe (see *Bleeding*); after which immerse each into a cold poultice of bran and Goulard, and occasionally moisten

the poultice with the same; or, if preferred, wet cloths may be kept around, or sponge boots. The horse should be extremely well littered up, and permitted constantly to lie down, as this position will favour the return of the blood: further to encourage which, his food and water should be given on the ground. In case amendment does not follow this treatment, the next day repeat the bleeding at the toe; and, if the general febrile symptoms run very high, bleed also from the neck again. Continue the cold applications to the feet, and proceed to actively blister around the pasterns, but avoid blistering so low as the coronets: neither would I recommend blistering at all, unless a beneficial effect is not apparent from the other treatment towards the close of the second day; but at this period, if the affection continues violent, by all means proceed to blister, and bandage up, as otherwise the blistering matter will be smeared over other parts. Hang a cradle also around the neck. As soon as amendment becomes apparent, common care only is then necessary; feed mildly, give plenty of water, allow the horse to rest much; and do not proceed to exercise until the feet have gained some firmness. Nor must it be forgotten that feet, once foundered, require great future caution in their management, as they are very liable to become again affected on any considerable exertion.

In cases of *imperfect* resolution, thin the feet; and, if contraction has commenced, score also, blister the coronets, and turn out, or treat as under.

CHRONIC FOUNDER, OR CONTRACTED FEET.

Chronic Founder, or *contraction* of the horn of the hoofs, sometimes called *hoof-bound* by the farriers, is, perhaps, of all the evils this noble animal is heir to, the most common and the most destructive. In this country I am convinced that it shortens the life of more horses than all other diseases united; and although the ruinous properties of this malady are very notorious and universally allowed, still they are not, I believe, considered so in the degree they merit: but whoever will pay as close an attention to the subject, as I have done for some years past, will, I am convinced, fully agree with me. Nature, ever bountiful in her gifts, bestows organs on her children fully requisite for their *natural* wants; but for *unnatural* habits she has not provided: on the contrary, she always punishes *artificial* deviations from her established laws, and has left it to the *ingenuity* of mankind to counteract the evils he has entailed, by subjecting the various domestic animals to a life of art. Among these evils the subject of our present inquiry stands foremost; but on the operation of what *particulars* of this artificial deviation the mischief arises, very different opinions have been formed: and as upon a due comprehension of this subject our principal means of *preventing* this

very important evil must be grounded; so it is of consequence that we examine and compare them separately.

It was the opinion of the French veterinarians, and of M. St. Bel as their copyist, that the *extreme paring* of the crust, the sole, and the frog of the foot, was the leading cause of contraction; and, therefore, on the first establishment of the Veterinary College, parings of all kinds were absolutely condemned, and the grand agent in the business of this supposed error, the *butteris*, was sent at once to the d—l. The present ingenious professor travelled over nearly the same grounds; but, that he might a little vary the course, he chose the *destruction of the frog simply* as his prime minister in this process: and on this ground he was led to adopt an *artificial frog* for the prevention of the evil. But if, as I now suspect, the mere reduction of this part is not the principal cause of the complaint, we need not wonder that the artificial frog was soon abandoned. The unnatural and grossly erroneous practice of forcing horses to stand constantly on litter, by producing artificial heat, has been considered as the immediate agent in contracting the feet. Others have attributed it to the friction of hard roads principally; while a still greater number regard a wrong system of shoeing as the grand cause. Mr. Bracy Clark has even written a luminous treatise expressly to shew that *all* shoeing, good or bad, necessarily tends to produce contraction, by the confinement the foot experiences from the nails.

When I first entered this profession, I also, from the weight of the authorities then in vogue, was disposed to adopt the opinion originally broached by La Fosse, that a lavish paring of the foot, but particularly of the frog, operated materially in the future contraction of it. But a very minute subsequent attention to the subject, and a diligent examination of innumerable horses every year, have altered my view of the matter, and led me to differ very widely from the general opinions entertained on this head. So contrary to them are my present sentiments, that I consider the popular doctrine of the *evils arising from paring the feet generally*, as having been productive of infinite mischief; and that, on the contrary, for one horse injured by paring, at least one hundred are ruined by letting it alone. I have been a patient attendant in many forges for hours together, and particularly where the drawing knife only was used, and I have invariably observed that, to avoid labour, the workmen are too apt to neglect paring altogether, contenting themselves with rasping the crust to a level, opening the heels, and smoothing the frog. Nor is this to be wondered at; for if the gentlemen, who are taught to cry out against this operation, were only once doomed to go through the extreme labour of *properly paring out* a foot that is but moderately grown, they would agree with me, that there was much more danger of its being neglected than of its being over-done. Dependant on this reasoning it may be proved also, that the popular outcry against the *butteris* is too far carried. The drawing knife is a neater instrument, and, for particular parts of the operation of paring, is infinitely most handy and proper; and it is much to be regretted

that its use is not more common among country smiths, many of whom never use it but in cases of surgical practice: some do not, or cannot, use it even then. Deprive these persons, therefore, of the butteris, and your horse must go unpared; nor would there be any difficulty in proving, that, instead of being so destructive as supposed, it is, when *judiciously* and *dexterously* applied, a very useful instrument, as it will do more work in a minute than the drawing knife can effect in five: and where there are a number of large coarse horses wanting to be shod, many of them with very high and large feet, this expedition must prove of very great consequence.

What I have advanced, however, though strictly consonant with reason and fact, is so directly in contradiction to the popular doctrines and opinions entertained, that I shall be taxed with an attempt at novelty, or rather with an affectation of peculiarity: but in answer to this, and fully to disprove it, I only request a minute attention and extended inquiry towards this subject. Nor must it be supposed that I am an *advocate* for the old system of treating the feet; on the contrary, in most of its parts I *condemn* it: for it is true, that the frog has been too often injudiciously pared, the bars erroneously cut out, but, worse than all, a thick heeled shoe with unequal pressure has been invariably afterwards put on. The sole tendency of what I mean to impress is, that extreme *general* paring seldom occurs; and that the evils of erroneous *partial* cuttings bear no possible comparison with the mischiefs that result from that neglect of *sufficient* paring; to which the outcry raised about twenty years ago, and since kept up, has so much contributed, and which has by its effects, propagated and increased this disease instead of diminishing it. But it must not in justice be omitted to state, that it is not the smith only to whom blame is to be attached on these occasions; for when a foot wants *much* paring, it is evident that a neglect must have occurred before it could be brought into this state. This originates in a mistaken opinion, common among the owners of horses, that paring of the feet is never necessary but when a renewal of the shoes is required; consequently, if a horse wears lightly, or is little used, he may not want new shoes oftener than once in two months: but the owner appears utterly unmindful that all this time the feet are becoming preternaturally increased in *length*, and *consequently* preternaturally decreased in *diameter;* and as the labour of reducing such a foot is considerable, not only from the increase but from the hardness of the substance, so the chance that a proper paring will be neglected is greatly increased.

It appears, therefore, that the destructive tendency to contraction in the feet of horses, so common, is not dependent on one, but on several causes, and this I believe is the opinion of all who examine the matter attentively; but the several degrees in which these operate, I am disposed to contend, are, in general, erroneously considered even by these persons. It has been the subject of much of my leisure to trace this correctly; and if I have not laboured in vain, these operating causes of *contraction* are in *degree* according to the scale in

which I have placed them. In the first place, and infinitely of greatest import, stands,

1*st*, A neglect of paring away the unnecessary parts of the horn.
2*dly*, The application of artificial heat.
3*dly*, The deprivation of natural moisture.
4*thly*, Constitutional liability.
5*thly*, Bad shoeing.
6*thly*, The existence of thrushes.
Lastly, The removal of the bars, and too great lessening of the frog.

That a *neglect of paring* is the principal agent in this case, appears evident on considering the operations of Nature in general, and the structure of horn in particular. This bountiful mother, who supplies her creatures according to their wants, yet is inimical to waste, and gives nothing unnecessarily. Under this principle it is that a certain portion of horn only (at least in general cases) is furnished to each animal, and consequently it cannot be possessed in height and breadth too. I will not say that a high foot may not in many cases have, if critically weighed, more horn than a lower one; but, *cæteris paribus*, as it increases in height, it decreases in diameter; and, as a principle, this cannot be too strongly impressed on the mind, nor can any rule be found with fewer exceptions. In coach-horse dealers' stables, where four year old horses frequently stand for two or three months, without perhaps having their shoes removed or changed, this complaint is not only common, but almost every horse so situated becomes contracted in the feet: however, as it is not to such a degree as to cause immediate lameness, so it passes unnoticed; but the disease has begun, and, when such a horse is sold, often before the force of the warranty is expired he is returned as unsound: but such is the force of habit, and such is the obstinacy of these persons, that, to avoid the trifling expense of removing the shoes, they risk the loss of the horse. In many cavalry regiments a similar neglect occurs, and every third horse, or even a greater portion, may be observed with high feet, and, as a *certain consequence*, with a partial contraction. As the system of shoeing in these regiments is generally good, and as they never stand on litter, or are too hotly placed; so it can only arise from their being shod by *contract*, by which means the shoeing only is paid for, but not the removes and paring: and this cause alone would destroy as many horses as an active campaign. It is not sufficiently considered that the *wear* the hoof would experience in a state of nature is prevented by the application of shoes: but the *growth* is not *stopped*; on the contrary, by rest and confinement in hot stables it is even increased beyond its natural limits. Instead, therefore, of a slight rasping once in six weeks, and sometimes even less frequently; in horses who exercise little, and wear lightly; instead of this, the shoes should be removed, at least where the feet grow fast, every three weeks; when the hoof should have a level paring throughout, so as to bring it to exactly the *natural* height of horn. But, as before

observed, so contrary to this is the usual custom, that after an interval, such as we have noticed, a horse goes to the smith's shop with an inordinate quantity of horn; the extreme ends of which being far removed from the surface that secreted it, become so dry and hard, that the smith, even were he so disposed, can hardly make any impression on it; he, therefore, only rasps or burns a smooth surface, and puts the new shoes on the old horn. Neither is it unlikely that his duty and inclination in this case go hand in hand; for the owner having adopted the prejudices that all smiths destroy the foot by excess of paring, has probably given peremptory orders that his horse's foot should never be *cut away*. It would, therefore, be difficult to conceive how such a foot should avoid contracting; seeing it is a general principle, and subject to few deviations, that the cylinder of the hoof will lessen nearly in the proportion that it lengthens. By pursuing this subject through the other causes, this matter will be still further elucidated.

The *application of artificial heat* stands next in order as a cause of contraction, and when we consider the common properties of hoof, nail, and horn (all of them the same), it will be found that this cause and the former are closely linked and operate together. It is the well-known nature of these substances to be much acted on by heat; they become softened by it, but only so long as the cause is applied, for, as they cool, they again become hard; and as the heat applied evaporates some of the contained moisture, so they always become harder and drier than before. But they have another peculiar property, and which is the actual operating cause in producing this complaint. This is the disposition to contract its fibres generally into a circular form, and which approximation of the extreme ends of the body is always inwards, with a reference to the centre of the circle; and this equally, whether the heat is applied externally or internally. This action may be easily exemplified by placing the segment of a truncated cylinder, or cone, as a piece of a cow's horn, before the fire; or the natural hoof may be placed in the same situation, when the contractile effects of the heat will *lessen* the partial circle in whichever side the heat operates; that is, when at all moderate: when an extreme heat is applied, the effects are not invariably the same; but this is dependent on another cause, and is besides inapplicable here. This invariable disposition to contract inwards on the application of heat operates here most importantly, and much the more so, as the effects are the same, whether the heat is inwardly or outwardly applied: and in the consideration of the subject of hoof contraction, these particular circumstances cannot be too strongly impressed on the recollection. Thus much being premised, it will not be difficult to recognise the application of artificial heat, in a degree much beyond a natural temperature, to the feet of horses in various ways. The standing for years bedded up in hot litter, heated still more by a stable without ventilation, must operate, on the above principles, towards the contraction of the horn of the hoof in an extraordinary manner; and the more also as it has been

shewn, that the longer the trunk of the hoof, and the thicker its walls, the more will this heat operate: consequently both cause and effect combine to increase the evil. Not only is the *external* heat applied to the feet increased by this erroneous practice, but the artificial life of such horses proves at the same time a source of additional heat *within*, which becomes also applied to the feet. For their high living, their long standing in one situation, and the heat to which they are exposed, must quicken the circulation, and more caloric must be evolved. Both these causes of heat operating on the horn, its contraction is a necessary consequence; and when this takes place, even in the slightest degree, it must occasion pressure on the internal parts of the feet, which are exactly adapted to the horny envelopement. These being highly vascular and tender, are by this stimulated into counter-action, and inflame: this produces another source of heat, which increases in a tenfold degree, as the cause continues to operate. Travelling on stony or hard roads must prove also another fruitful source of heat from the friction occasioned; and when such exercise is either violent or long-continued, the production of caloric must be immense. Heat also not only acts mechanically in contracting the horn, but it also operates additionally, inasmuch as it is one of its principal properties to promote an *unnatural* increase of the growth of horn both in length and thickness, by means of the stimulus it affords to an additional secretion. Thus, therefore, the evil is by this agent magnified in a twofold manner. Another source of artificial heat has been inveighed against in the bitterest terms, which is the application of a heated shoe to the sole of the foot. The evils resulting from this certainly reprehensible practice have been, however, greatly overrated; and the more so, I apprehend, as it is used in some measure as a substitute, though an improper one, for paring; and likewise as in the unequal shoes of country smiths it may be even necessary to demonstrate the bearing points that would otherwise escape notice: nor is the practice ever, I believe, carried to any very hurtful extent.

The *absence of natural moisture* must also tend in no small degree to produce contraction. Moisture has exactly the contrary effect on horn to what heat has; its application, therefore, greatly tends to counteract the contractile disposition. It also softens, and thus enables the pressure arising from the weight of the body to expand the relaxed hoof: but when, by the extreme length and thickness of the hoof, its resistance is increased beyond even the power of the moisture to penetrate, even this benefit, when occasionally applied, becomes lost. In a state of nature it is evident that the hoofs must meet with much moisture, of which a life of art wholly deprives them. A stabled horse frequently does not get his feet once moistened in twenty-four hours; even his only chance from the splashing of his urine is carefully prevented by the litter: but in a state of nature, at least during one-third of this time, these parts are exposed to the dew, and, during the remainder, are frequently immersed in rivers and ponds. Horses also less artificially treated than

those of the gentry, as farmers' horses, and the generality of horses kept in the country, experience the benefits of moisture to a certain degree; for they get turned out occasionally, and consequently we find they are proportionally less subject to this evil.

Constitutional liability is certainly likewise a source of contraction, and this to a considerable degree; but the remote cause of this tendency it is not easy to account for, any more than the constitutional liability to cataract. It is probable that both are connected with the life of art we have subjected the animal to; for it would be an attack on all-bountiful Nature which she does not deserve, to suppose she has *originally* given so destructive a disease as ophthalmia must prove to a wild horse; and founder would prove scarcely less so. Neither can the introduction of the eastern breed have wholly produced it, though it may certainly have increased the tendency; for we have numerous proofs that contraction of the feet was a subject treated of in the most antient writings on farriery. This liability must, therefore, be attributed to the general exciting causes of increased circulation occasioned by artificial habits, though the introduction of the eastern breed, as being of a more sanguineous temperament, may, as before hinted, have considerably increased this tendency. In the arid plains of the east a small foot was not only sufficient, but also most convenient; while the moist pastures of the north required a broad flat support. When, therefore, this breed was introduced to this kingdom, and became universally diffused among us, we cannot wonder that the small foot became propagated also, which, not being natural here as there, might easily prove a source of mischief. There are very few breeds which have not some small portion of what is called *blood* in them; but those that are original and purely northern, as the heavy cart horse, and some of the mountainous, it is remarkable are much less affected with it; and, on the contrary, blood horses of all others are peculiarly prone to it. Some colours also seem to have a greater disposition to contracted feet than others: in dark chesnut horses it is particularly common; and I think the better breed of blacks are rather more subject than some others. It is possible that the circulation in these may be in some measure quicker than in others; in confirmation of which, it may be observed, that they certainly possess a peculiarly ardent fiery disposition. White feet, as being weak, are likewise very obnoxious to it. It is probably from an increased circulation that stallions also are so prone to it. In fact, the more this subject is examined, the more proofs arise, and the more clearly these truths evince themselves.

Injudicious shoeing.—This certainly operates in producing contraction, and perhaps not in one point only, but in several. The custom of nailing the shoes on so extremely tight, particularly where the crust is not very strong, must affect the feet considerably, by irritating them, and by preventing their ordinary expansion. The bad form of the shoe must also be very hurtful; the unequal pressure tenders and inflames the foot; but of all the errors in the form, none are so hurtful as the thickness of the heels. This baneful

method is still in full force, and, therefore, the evil it occasions is not at all abated. By this the heels are weakened and worn away, and corns produced, the constant pain of which inflames, heats, and consequently contracts. Nor does the inward slanting direction of the *foot surface* of the heels of the shoe contribute much less, though it has been attempted to be proved that this does not operate unfavourably, which is certainly erroneous: but it does not follow from this that *all* shoeing must necessarily occasion contraction, at least not in the destructive degree maintained by Mr. B. Clark, as is proved by the very circumstances we are detailing: for, were this the case, farmers' horses, which are more early worked and some of them *often* shod, and almost all of them subjected to bad shoeing, must necessarily be affected most of all, instead of which it is exactly the reverse. We shall have occasion to enlarge on this in another place.

The *existence of thrushes* is too much passed over among horsemen. I am fully persuaded that they operate in the production of founder in a much greater degree than is usually imagined; and in many thousand instances I never met with a truly *harmless* thrush. This complaint may be a cause or a consequence of contraction. It is the latter state of it I here allude to; the other will be examined under the subject of thrushes. Thrushes may arise in otherwise healthy feet from confinement, in which the constitution wanting an outlet, and accumulation taking place here, inflammation of the secreting frog follows. In other instances they are occasioned by standing on wet dung, until the outer horn becomes penetrated, and the inner acted on by the saline moisture. As it is well known that thrushes are an exuding of matter from the natural or artificial openings of the frog; and as no purulent matter can be formed without inflammation, nor can inflammation exist without an increase of heat; so, having already proved how heat acts, it will not be difficult to understand how every thrush must tend to contract the foot in which it exists.—See the subject of *Thrush*.

The *destruction of the bars, and too great lessening of the frog*.—That both these errors are productive of contraction there can be no doubt: but I cannot help thinking that the particular attention to these immediate causes, when veterinary medicine first became regularly studied among us, has been productive of considerable harm, not as being in itself erroneous, but because it diverted the mind from causes of the evil much more active and mischievous. In the generality of country-shod horses, the bars are always cut away, let ever so little other paring take place; yet these horses have less contraction than others: and though the frog also is described as a wedge-like cushion, purposely placed by nature to keep the walls asunder, a very little examination of the parts will shew that it is utterly unfit for this purpose, having but little solidity and force, and being divided in its centre, which weakens it to a great degree; whereas, were it intended for a wedge, it would certainly be solid throughout. The principal intention in the formation of the frog

appears to be as a hanging point of support to the foot, to prevent it from sliding, which the crust and sole would be liable to do were it not for this admirable contrivance. This matter being already fully treated on, when describing the anatomical structure of the foot, we shall not pursue it further; but presuming the natural insufficiency of the frog to prevent contraction to be fully established, it is evident that the simple lessening of it cannot *materially* assist contraction: and we are further led to this supposition, from observing that many horses remain with open heels, who are deprived of the action of the frog, either by its being cut away, or by the operation of the calkins of the shoe, which effectually elevate it beyond the requisite pressure, to enable it to act as an expander.

From what, therefore, has been advanced, it appears to me that some of the most popular causes assigned as principal agents in contracting the feet are more harmless than is generally supposed. Good shoeing tends, perhaps, but little to it. Bad made shoes must do it much more, being still not so much so as is usually imagined. Neither, as we have shewn, does the destruction of the bars and frog account for it; and still less will the extravagant paring, in general falsely attributed to the smiths, appear the cause. We must, therefore, look to the other sources we have pointed out, acting in conjunction, as the *principal* agents; and to the preternatural increase of horn, and the omission of paring it away, as most of all conducive. Having thus considered the *causes* of contraction, we will next proceed to the *appearances* it presents, and the *consequences* that follow.

Symptoms and Appearances of Chronic Founder.—The hoof, from an almost circular form (see *Description of Foot*), becomes, when foundered, much elongated; and, on taking up such a foot, the frog, instead of a full bold appearance, seems wedged and squeezed between the contracted bifurcations of the heels, which, in these cases, usually experience the greatest share of the contraction, and are then said by dealers and grooms to be *wired in*. Some contractions operate on the whole circumference of the horn; more frequently, however, the heels, as being the thinnest parts, suffer the most; and the inner one, as being the weakest of the two, is generally more drawn in than the outer: nor is it uncommon for it to be confined to the inner side only. Sometimes the contraction affects the whole of the cylinder of the hoof equally: sometimes it is greatest round the coronet, and at others it is most lessened towards the sole: but contracted heels more frequently present their narrowest surface below. From the different degrees of inflammation which have existed at different times, the hoof is often encircled with horny rings, and which are more common in the weak thin foot than in the strong.

The hinder hoofs, though not wholly exempt, yet are infinitely less liable to contraction, from the absence of many of the exciting causes present in the fore. They are in the first place thinner at the toes, and thicker at the heel, which greatly destroys the contracting ten-

dency. They are much less exposed to heat and to pressure, and meet with more occasional moisture. It may be also remarked, that when they are contracted, it more usually affects them throughout the whole circumference; though I have seen them also *wired in* at the heels. Neither does the contraction of the hinder feet produce such serious consequences as that of the fore.

Some horses bear long and considerable contraction before lameness ensues; and it may be regarded as an established fact, that a small contraction hastily applied, produces more immediate lameness than a much greater one more slowly brought on. Dealers' horses often fall very suddenly lame, without much apparent lessening of the foot; the reason is, that, coming from farmers or other country persons, they are unused to the hot stables they are placed in, when they get into these hands, and the hoofs thus suddenly lessen. This effect is, in general, easily removed by standing in water a few days, which as suddenly expands them. From the causes before detailed contracted hoofs are almost always higher than others, and the sole is likewise generally concave: it is in general much thicker in substance also, which greatly adds to the pain usually felt in progression. From the pressure that occurs on the parts within, there is much external heat, and great pain is experienced, which obliges the horse, to relieve himself from the additional pressure arising from the weight of the body, by alternately placing one foot forward and then the other; which grooms call *fencing*, or *pointing*. Whenever, therefore, this is observed, however free from lameness the horse may appear, such feet are diseased: and more frequently on close inspection in these cases one may detect a shortened step and feeling manner, as though the horse walked on hot irons; and during exercise the proper sensibility seems to be lost, for such horses seldom step true, but trip and stumble. Nor can we wonder that lameness should be the consequence of contraction, when we consider how exquisitely sensible are the internal parts of the foot, and how completely they fill up the cavity, which, being lessened, must subject the contained parts to pressure between the hard substances of the coffin bone, the walls, and sole. This pressure, so experienced, occasions reaction in the vessels, and inflammation ensues; by which these vascular parts are rendered even more turgid and full, and the poor animal most likely feels as much as we do after a long day's walk in tight shoes. When this pressure is not very considerable, the inflammation will be moderate, particularly if the cause is simply mechanical, and when the horse has no constitutional tendency to contraction. In such cases the tenderness will not absolutely lame, but the horse continues his work, and gets but slowly worse, though, if attentively observed, he will be seen to step a little shorter, to trip oftener, and is somewhat tender; yet the alteration is so gradual, that the evil often remains undiscovered, till some accidental circumstance increases it, when he will become suddenly lame. If a farrier of the old school is called to such a case, the shoulders are searched,

and are probably condemned to a painful treatment as the affected part.

But when, in addition to a constitutional liability, a neglect of paring occurs, united also perhaps with some of the other assistant causes, the complaint proceeds more rapidly; the highly inflamed vessels deposit coagulable lymph between the laminæ, and over the sensible sole, which produces a morbid sensibility, but destroys the natural one, and occasions these cases to be expressively called by the common farriers a *numbness* in the feet; and when fully formed, the complaint makes them move as though benumbed. The evil does not, however, usually rest here, but the inflammation extends to the bones and cartilages; and while the former throws out bony spiculi around it, the latter becomes almost wholly converted into bone; and consequently extreme lameness must then inevitably ensue.

Treatment.—From what has been premised it will appear that contraction may arise from an inward or an outward cause; that is, that when a constitutional liability exists, the internal parts of the feet probably become first affected, and the heat and inflammation occasioned produce the contraction. In such case it is evident that enlarging the hoof will not prove a permanent cure. In other instances some outward cause, as heat, deprivation of moisture, or neglect in paring, may have first occasioned a lessening of the hoof, the pressure of which on the internal soft parts may have occasioned such reaction and inflammation as to have produced some of the evils detailed. Here likewise enlarging the hoof can only be palliative. But fortunately there are other cases wherein no internal derangement has taken place, although the outward pressure may be considerable, and have produced heat, tenderness, and lameness. In these instances the ill effects are not permanent, but, by enlarging the hoofs, the pressure is taken off, and the evil removed.

It will naturally follow from this view of the matter, that it is very important for the veterinary surgeon to endeavour to form a correct judgment of the state of the internal parts of the foot, before he gives an opinion, or proceeds to act. In the one case no means would be equal to a perfect cure; and consequently it would not be prudent to recommend a tedious and expensive process, when a palliative treatment only ought to be adopted: but in the latter case a perfect cure would follow a judicious mode of operation, and, therefore, these circumstances would not deter from it. This judgment can only be formed from a close attention to appearances and facts. If the contraction has not existed long, or even if it has, yet has proceeded very slowly; and particularly if it can be learned that the horse, from confinement, neglect of paring, and other artificial habits, has evidently been exposed to the *outward* causes producing contraction; then there is every reason to conclude that the internal parts are not materially affected. This will also be rendered still

more likely if there exist no signs of predisposition to the disease, from colour, breed, &c. &c.

To *enlarge the contracted hoof* many mechanical contrivances have been invented; some of them very ingenious, and most of them more or less productive of the desired end: but unfortunately for all such plans of cure, in most instances, as soon as the operating cause has been removed, contraction has again returned. This has happened so frequently, that it has made many persons inimical to the attempting any thing of the kind. The reasons of this failure are various. In the first place, the horse is, too often, again subjected to high feeding, heat of stable, neglect of paring, a want of moisture, undue confinement; and probably is again allowed to stand on litter. Any of these will operate in its reproduction, and no case can resist their combined influence. In other instances thrushes again appear, and, being neglected, prove a source of renewed contraction. Some also may reproduce it by a constitutional liability, not sufficiently counteracted by more natural habits, as turning out, &c. Although, therefore, candour obliges me to own, that a return of the affection is not uncommon; yet it is more than probable that many of such cases are attributable to the causes assigned.

The oldest remedy for contraction was *drawing the sole,* on which we will waste no more time than to observe, that if every wretch who drew a sole was to lose his scalp, it would be but a just retribution. The next remedy was the old screw shoe, which was little more than a common shoe jointed at the toe, and having a screw at the heel, by which it might be expanded at pleasure. This shoe has been in very common use, and has proved useful; but there are many objections to it. The first objection is common to this and to all expanding shoes, that in many cases it begins at the wrong end; for contraction is frequently greatest at the coronet, and likewise frequently commences there. The reasons for this are, that the horn is weakest at the coronet, and there the resistance is less also; for below, the sole and frog form considerable obstacles to the contraction. The next objection to this shoe is, that it acts on the whole circle of the hoof, whereas in the majority of instances the contraction exists principally in the heels, and in some in the inner heel only.

To obviate these objections, some years ago I adopted shoes whose joints were variously placed according to the contraction; for a hoof contracted generally, I framed a joint at the toe in the old way. When the heels only were drawn in, a joint was made opposite each quarter; and when the inner heel only was affected, I used one with a joint on that side only. These joints were not operated on by the former clumsy method of either sliding bars or heel screws across the foot; but by small screws within the body of the shoe, that acted as levers, and forced one limb of the shoe from the other. Each heel had also a *clip* to embrace the bars. With these shoes I have frequently extended contracted feet, and in

many cases, in conjunction with thinning and moisture, their use is marked and considerable: but they, in common with all other expanding shoes, are still liable to objection; for whenever either constitutional liability exists, or any of the external causes are allowed again to operate ever so slightly, I have observed the recurrence is more frequent after mechanical expansion by the means of shoes than after any other of the plans in use. The expanding process, by means of screw shoes, was a few years ago successfully (that is, to himself successfully) practised by an officer of the army: but the recurrence of the complaint, so common after these means, soon destroyed the undeserved reputation of the process, and it fell into disuse.

Other means have also been used for the cure of this complaint; such as dividing the heels the whole length; taking up the pastern arteries; and in some cases taking up the pastern nerves has been practised. Firing the coronet has been tried; blistering also. Turning out has long been the common remedy; and immersing in moisture has been little less so. The inefficiency of most of these, and the liability of a recurrence of the complaint after their use, long ago induced some practitioners to endeavour to make the foot itself enlarge its horny covering. To this end they lessened the resistance of the envelopement by numerous deep scores around, operating as so many hinges, on which the hoof, yielding to the pressure of the internal parts, expanded. To this was sometimes added a thinning of the hoof generally: but very seldom were the heels lowered or the sole divested of its inordinate increase; so that only half the proper benefit was derived. When Mr. Coleman began his career, he adopted and amended this plan; and, by his recommendation, it became more known and practised than it had heretofore been. I also, previous to this, had made some trials of it; but at that time I preferred the quicker, though less permanent mode of the expanding shoe, assisted by moisture and other supposed auxiliaries. I had at one time eight horses, each under a separate process for reducing hoof contraction.

An extensive subsequent experience has taught me to depend principally on what may be called a *natural* and *voluntary* expansion of the hoof, in contradiction to that produced by expanding shoes, which may be termed the *mechanical* and *forced* enlargement of it. By the former mode a more *radical cure* is effected; for the parts are themselves brought not so much to enlarge the materials of the old hoof, as to form altogether a new one; and which, if the former disposing causes of contraction are avoided, will not be subject to disease. The means I have long and successfully used, and which I shall proceed to detail, are of this kind; and though I lay no claim to the invention, yet I believe few have tried it so extensively, and none have so varied its modes, or watched its progress so attentively as myself: and, therefore, though the general practice of it is not new, the full detail of it, I am persuaded, is so; for hitherto this valuable means of removing contraction has been hardly more

than hinted at: and, I believe that I am correct when I state, that no process of this kind is regularly described even at our national seminary for veterinary instruction.

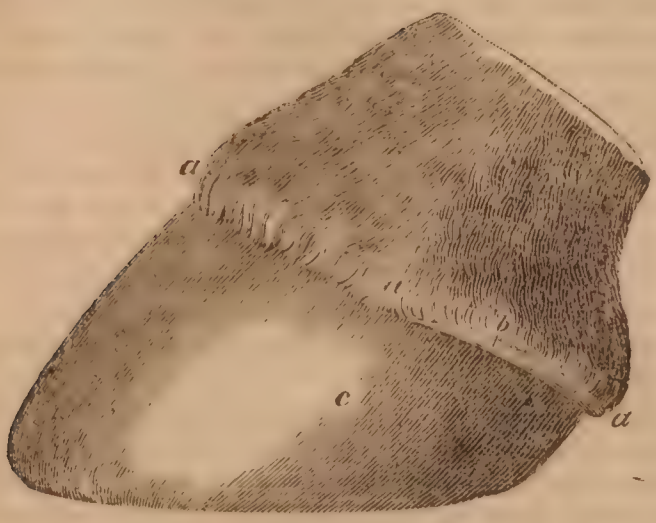
When a hoof is contracted, on a removal of such portions of offending horn as can be spared, a considerable part of the pressure is at once removed, and the parts within begin immediately to reinstate themselves, and to enter on the process of forming an enlarged circle, which sufficiently shews the beneficial tendency of such a proceeding. And it is upon a removal of the horn in such a way as to lessen the contraction as much as possible, without weakening the support of the hoof, that the nicety of this operation depends. The mode of doing this will be to take away such portions as can be best spared, and yet such as are the principal agents in the injury. These prove to be, in most cases, the contracted horn of the heels, and likewise, in no less a degree, the inordinate increase of the sole; for, strange as it may appear, experience has fully proved, that a thickened state of the sole, instead of affording a support to a tender foot, is the most painful addition that can be made to it.

To render the performance of *this useful operation* easy and intelligible, I have added a figure representing a hoof so operated on, and which, with the following directions, will enable any intelligent smith readily to do the same. It should, however, be premised, that when thrushes exist in a foot or feet to be operated on, it is highly necessary that they should be first removed, particularly if considerable, unless, indeed, it should be very clear that they are actually occasioned by the extreme pressure of the heels on the frogs; in which case proceed to thin the heels without too much lowering them, but sufficient to bring the lessened frog into the line of pressure as much as possible. Treat afterwards as directed under *Thrushes*, and, when an evident amendment appears, proceed to complete the whole of what is intended. A very small thrushy affection need not, however, impede the process, which, on the contrary, may be at once proceeded on as follows.

Expanding process.—First let the *sole* be carefully pared. I have already stated that the increase of this, which is surprisingly great in usual cases of founder, greatly aggravates the painful affection; so much so, that I have frequently afforded instant relief to a hoof-bound horse by merely thinning the sole. This fact seldom enters the head of a smith, nor is its operation sufficiently attended to even by the veterinarian: but at no time can a horse, at all affected in his feet by contraction, step with even tolerable ease without his soles are thin. Having, therefore, pared the sole all over equally, until the thumb, by a firm pressure, is able to make it yield, proceed to lower the crust generally, correspondent with a proper line of the sole; but lower the heels still more closely, in fact as much as they can safely bear, without depriving them of all their horny covering, or reducing them too much beyond the general level. In this paring clear away the horn within the angle of the bars, and along the whole line; but leave the bars themselves sound and full. Do

the same by the frog, leaving it as large as possible to relieve the weakened heels, clearing away only the ragged parts, unless it is thrushy, when all pressing and decayed portions, and all *under-runnings*, must be cut out clear.

Having finished the under surface, proceed to rasp the walls or sides of the hoof, beginning about the middle of the quarter, and rasping it to the heel. I find it however useful first to draw a line nearly or quite around the hoof, immediately under the coronary ring, which is that rising covered with the last hairs above the hoof, directly below the quick, marked *a a a* in the *fig.* This line should be made as near the quick or sensible part as possible, yet must by no means touch or wound it; and in doing this the horse's feelings will in general be a pretty sure guide, for as the rasp approaches near the vascular portion, he will flinch considerably. This line proves a direction to the rasping, which should be carried close to it from the beginning of the quarters *about c* in the *fig.* to the heels, doing it lightly at first, as may be seen *by b* in the *fig.*, but deepening the rasping as it approaches the heels, so as to remove the substance of the horn in a progressive thickness from the quarters to the heels, rasping the whole surface uniformly from the coronet downwards, leaving towards the heels a covering of horn of only an eighth of an inch in thickness, or in fact so much only as the thumb nail can indent by a firm pressure, carefully however avoiding to go too deep, so as to wound the sensible parts underneath. To avoid this danger, as well as to leave the coronary ring distinct, and free from the pressure of any more of the contracted horn than is necessary simply to cover it, the operation should be finished with a small drawing knife, by which means all the hard horn can be removed from parts where the rasp would be inconvenient, particularly towards the heels, where the thining should be carried back quite to the inflections or binders (vide *posterior c* in the *fig.*). The coronary ring should be left quite distinct by a clean angular removal of horn, as seen at *b* in the *fig.*; and upon a regular thinning from above downwards of the whole of the horny portion covering the lateral parts of the heels, except the thin lamella of covering we have directed, depends the perfection of the operation. I have endeavoured to make it understood that the rasping having commenced at the *black c* in the *fig.* is there to be lightly done, and a moderate portion of horn only removed, increasing the quantity as the rasping proceeds, till having reached the centre of the quarters it is then to be removed to the prescribed thinness. When finished, the hoof will present exactly the appearance depicted in the following figure.



When there is a very great thickness of horn, I usually also rasp the whole circumference of the hoof moderately, so as a little to lessen the general resistance without weakening the foot, which should be carefully avoided. To favour the further expansion, let the foot now be taken in front, and a line of rasping be carried from above downwards to a moderate thinness; not however so thin as at the heels, which would weaken the foot too much. This front rasping should not be more than half or three quarters of an inch over, and its intention will explain itself; for as the centre of *general* contraction must be here, and as even though the heels should be principally affected, yet there is usually also some lessening of the whole circumference, so the resistance to expanding is by this front hinge materially decreased; and of so much importance is this, that I have known it practised as a prevention at every shoeing with manifest advantage. When the inner quarter only is affected with contraction, as is now and then the case, then the rasping may be performed on that only; it will be very seldom, however, but some wiring in of the outer quarter also may be observed.

It is evident that the above mode, performed exactly as here laid down, is principally calculated for the benefit of such feet as are contracted at the heels, with but a small lessening of the general circumference of the hoof. But there are cases in which the horny box is contracted *generally*; in such instances I have still rasped the heels, but not quite so deeply; nor have I carried the rasping so far forwards, but I have instead added three additional hinges to each side, by means of the old method of *scores* made in the hoof with a fine drawing knife*.

* It is remarkable how far a prejudice in favour of novelty, or what is often mistaken for improvement, will lead persons. In a work just published, and otherwise ably written, by a pupil of Mr. B. Clark, who appears to have adopted all his master's ideas, the practice of scoring the hoof is called *barbarous*, and described as *cruel*. I hope that whoever has patiently followed me through this work will not tax me with *cruelty*, even though I occasionally recommend scoring, which is

These scores should be narrow and of a moderate depth; the strongest hoofs will allow a quarter of an inch with perfect safety, and the weakest more than an eighth. One of these scores may be made a little within the heel side of the anterior letter *c*; the next a little beyond the toe side of the same letter; and the third between that and the front of the foot, where another ought to be placed. Having finished the operation thus far, put on a tip or tips with four or five nails only to each, and these towards the toe. To complete the process, if the heat and lameness were considerable before the operation, blister round the coronet, which greatly encourages the growth of new horn, and also tends to remove any mischief that the contraction may have occasioned.

The future management must depend on circumstances, and on the convenience of the owner. One thing, however, is indispensible, which is the application of moisture to lessen the remaining resistance, and thereby assist the expansion, as well as to promote the future growth of the horn. The best means of applying this moisture is to turn out to grass; but unless this is done where the situation is wet, little benefit will be derived. A dry pasture in a hot summer without rain would be injurious instead of beneficial; and a moist meadow, salt marsh, or one wherein is a pond to occasionally wet the feet, should be chosen. When thrushes exist, they need be no impediment to the turning out; but in such cases it is requisite that the horse be taken up every other day at farthest, and the thrushes dressed. When turning out is impracticable, it becomes a consideration as to the best mode of keeping the feet moist in the stable; and innumerable have been the contrivances for this purpose. Boots of all kinds, some containing sponge, some to be filled with poultice, &c.

certainly equally barbarous with cutting one's own nails, trimming one's hair, or other as harmless operations, on insensible parts. This attachment to a new theory runs through the whole of this gentleman's book, and makes him, I think, on the subject of contraction, which he has chosen altogether to separate from founder, mistake cause for effect. To such an extent are these novel opinions carried, that he considers all attempts at preventing contraction useless, so long as horses continue to be shod with shoes attached by means of nails. When contraction has taken place, he not only considers all plans of enlarging the hoof inefficient, but he even deprecates their use altogether, and says 'that it is sufficiently obvious why '*attempts to relieve* the animal from the constant tenderness and lameness of con-'traction are productive of founder,' &c. No one would, I believe, understand how it would be even *possible* for this to happen, unless they were made aware that founder and the punniced foot are blended into one disease in this work. This surely, from a person who is teaching a more approved method of treating the diseases of the feet, is carrying a blind attachment to a given theory much too far. After this, not only must every practitioner who recommends any plan for enlarging the hoof, mislead his employer, and injure his patient; but a notoriously ruinous and *painful* affection must be let alone, for the imaginary chance of producing a punniced state of the feet. Imaginary is this chance, for I never saw it once follow as a consequence of either scoring, rasping, or the expanding shoe. Without any invidious motive, I cannot but look with suspicion on these sudden gleams of light. With more than twenty years study and experience I have never found the way to become at once wiser than my contemporaries; and when I daily see these luminous novelties sink below the level of long established facts and experience, I cannot yield them my credence.

have been invented; but they are so little desirable, that they are seldom retained long in use. I have, however, seen some cased with small iron plates with hinges that answered the end tolerably. Standing in clay is a common plan, and provided the horse stands level it is not an inconvenient one; but often the paving of the stable is pulled up under the fore feet, and the poor animal is tortured by resting the lame limbs on a *descent*. On the other hand, I have seen him *mounted* up in a wooden trough, where much force was required to bring him into it. The best mode certainly is to cover the floor of a loose box with dung, mould, or clay, moistened so as to allow the wet mass to reach above the coronet. In this the horse can move about during the day, and may be removed at night to a stable, having the moisture still continued by means of wet cloths around the feet; and which cloths, when other means of moisture cannot be resorted to, may be wholly depended on. Two circles of thick woollen cloth, doubled over a tape within, will form a convenient apparatus, which tied (not tightly) around the pastern will adapt itself to the shape of the foot, and, being dipped in water two or three times a day, will keep it wet.

If moisture is duly supplied, the coronary ring will expand, and the new horn will proceed downwards in a large bulbous expansion: the heels also will widen, and this faster than the frog is able to keep pace with them, seeing its growth in these cases is generally slow. This will leave a hollowness and excavated appearance which it will take some time to fill up: and when this exists in a very considerable degree, I have considered it as a mark that the reproduction of horn is not entirely free from disease, and the benefits resulting from it will not be perfect or lasting. Care should be taken that the tips do not come off unperceived, and the horse remain without them. Every three weeks the sole should be carefully thinned, at which time the old horn may be slightly rasped again, and the line of separation between the old and new rendered distinct and angular as at first. If also the bulbous prominence of the new horn should be very high, thin it a very little by means of the rasp, to prevent internal pressure. In about three months the new horn will first reach the heels and become opposed to the ground, at which time, if the horse is much wanted, he may be taken up and may be *gently* worked in *bar shoes;* but if he can be suffered to remain longer without work, it will be advantageous. The whole of the appearances occasioned by the rasping will not be effaced in less than six months.

After having thus treated at large on this process, from which I have so frequently experienced the greatest benefits, I am yet fully inclined to own, that in no instance does the old adage, *that prevention is better than cure*, apply more forcibly than here. Perhaps almost every contraction might have been *prevented;* but by no means can any considerable proportion be *cured* when it has taken place. When, therefore, I enlarge so much for the use of the *veterinarian* by detailing the curative means, I would as particularly draw the attention of the *amateur* and general owners of horses to means of prevention; and

which conveniently follow here, because they are equally applicable as a general preventive to the always healthy foot, as to that which has been operated on. These following preventive rules are merely a *text;* the *context* is the preceding detail of the causes and effects of contraction, which should be first attended to.

The prevention of chronic founder or contraction in the feet must depend on avoiding the known causes of the evil. The first of these is a neglect of paring, which may be obviated by giving strict orders, or, what is better, *seeing* that every horse, if his horn grows fast, never goes more than three weeks, if slow not more than a month, without a *level paring* over the *sole*, until it can yield to the pressure of the thumb, and this whether the shoes want renewing or not. The *heels* should also be *lowered* with the rest; nothing prevents contraction so much as keeping them low. Apply always a shoe of *equal pressure* throughout (see *Shoeing*); and still remember to *thin the front* of the hoof at each paring: nor must a continuance of *moisture* be dispensed with. I have repeated it with the greatest advantage, and without the least inconvenience, by means of the cloths before described, for a space of three years. In addition to this, never suffer the horse to *stand on litter;* and, in summer, water the place he stands on three times a day; and in feet disposed to contract, every night apply *stopping*, the various kinds of which see in *Mat. Med. Thrushes* must be immediately attended to if they appear; and as it has been shewn that contraction is frequently the consequence of *inward* heat, that is, an increased circulation operating in some constitutions, so high living, long confinement without exercise, undue heat of stables, should likewise be no less taken into the account, and no less carefully avoided. I would not willingly omit to notice every means that can at all tend to this desirable end; therefore, although I am clearly of opinion that they will prove equally beneficial with the *patent frog*, yet, as others may entertain a different opinion, I must not leave out the mention of Mr. Coleman's *clip shoes*, which were purposely invented to prevent this evil, by embracing the heels and holding them in a determinate situation. The argument is specious, but the application is difficult; and more than all, even when well applied, they are wholly inadequate.—See *Shoeing*.

THE PUMICED FOOT.

As this is a very common effect of both acute and chronic founder, an account of it very properly follows those affections. Mr. B. Clark has observed, that it ought to be called the *pomme* foot; and a very ingenious and respectable pupil of his, in a work just published, is so influenced by attachment to his teacher's novel theories, as to blend this with founder, and to consider them as one and the same affection. This appears to me extremely erroneous, for the *pomme foot* is only *one* of the *effects* of founder, which is itself clearly a distinct

disease, either acute or chronic, having several varieties of termination besides this. Not only in a theoretical and systematic point of view is this wrong, but in a practical one much more so; for the author, attending to the ruinous nature of this *one* consequence of founder only, is led to enter a philippic against all those ingenious attempts at remedying the *other* effects of founder that have proved useful in the practice of most veterinarians. Turning to grass wholly without shoes, in every instance of contracted feet, I think should be avoided; but that the pumiced foot is *caused* by the other attempts at remedying contraction, is, I think, not only an erroneous, but a most hurtful doctrine (see *note*, p. 557, 558.).

Pumiced feet are in every instance the effect of inflammation; but the vascular increase may be an acute or a chronic one. When they are the effect of the former, the complaint immediately follows an attack of *acute founder*, and is brought about in the manner described when treating on that disease. But when it is produced by a slow chronic inflammation, its attack is much more insidious and slow, and its appearances gradual. The front of the hoof is first observed to fall in, and the sole to become nearly flat; at which time the horse begins to falter, and is sometimes very lame, at others can move moderately well. The foot when shod generally presents no acquisition of horn; on the contrary the sole becomes thinner and thinner, and at last bulges out into a surface more or less convex as the internal derangement is greater or less. The large wide feet of the native horses of moist counties are most prone to this evil, for their feet cannot resist the weakening and irritating effect of battering on stony roads; and least of all on the pavement of the streets of London and other cities. Any kind of feet, however, may take on the affection, from either hasty or slow vascular increase, though it is more common for the chronic inflammation to operate on smaller hoofs and those of higher bred horses, principally by contracting the walls of the circumference, and by thickening the sole, instead of diminishing its substance.

Neither is the inflammation producing this affection altogether the same with that which contracts the foot; for in most cases the former is attended with a general increase of horn; whereas in the latter there is *altogether* a decrease, for both the walls and the sole usually become thinner. The laminæ seem first to become affected, and lose their elasticity; and their vascularity appears excited, not to secrete horn, but a considerable quantity of a diseased substance, which, with the weakened structure of these supports, displaces the coffin bone, drawing the crust with it, and greatly increasing the natural obliquity of the hoof. The pressure that the coffin bone thus displaced makes on the fleshy sole, occasions sometimes an absorption of its own edges, but always an interruption to the healthy secretion of horn, which accounts for the diminished thickness of the sole before noticed. The sole, therefore, being unable to resist the superincumbent weight, loses its concavity, and, yielding to the altered form of the parts above it, bulges into convexity. The whole of the parts

within likewise become deranged in structure as well as situation. A large quantity of hardened matter, between the nature of horn and coagulable lymph, occupies the space in front, left by the recession of the coffin bone, which now approaches the heels, and rests there in an altered line of declivity.

The *Treatment* of these feet can be only *palliative*, as a removal of the deformity has never taken place. I have experienced much benefit from blistering the coronets in early cases, which has stimulated the foot to an increased secretion of horn. Every means must be taken to avoid outer pressure on the sole, which is not only painful, but actually aggravates the disease; and if sufficient rest were now and then allowed in these cases for the crust to grow level with the sole, such horses might be rendered useful; but instead of this it is permitted to wear away by repeated shoeings, until the sole is exposed, and becomes tender and unable to bear the most ordinary pressure. Punniced feet should not be kept too moist, nor can they ever be cured by turning out without shoes, though I once thought differently; but they may be very properly dressed every day, both sole and walls, with a mixture of tar and oil, which proves extremely beneficial to them. The *shoe* in use for these feet is sufficiently known, being framed with a very wide web, and either made so thick as to allow of being bevelled away on the inner surface, to receive the convexity of the sole without pressing on it, or otherwise cockelled generally to the shape. But lately a different mode has been practised by some persons, and strongly recommended, which is to apply a shoe so narrow in the web as to cover the crust only, but of sufficient thickness to elevate the sole above the chance of pressure from the ground. This shoe is said to obviate the ill effects of stones, gravel, &c., getting under the wide webbed shoe, which sometimes lamed the horse; and it is said that punniced horses go best in these kind of shoes.—Facts are stubborn things: there can be therefore no objection to their trial, though, reasoning from analogy, I should be disposed to depend principally on the older method, which, if judiciously managed, will render such feet very useful.

CORNS.

[*Bleime.*

These very troublesome affections arise from injury done to the vessels of the sensible sole, exactly at the surfaces of union between it and the horny sole, whereby blood becomes extravasated within the angle of the inflections of the heels, that is, between the outer crust and bars. They appear in every instance the effect of undue pressure, by which the sensible vascular sole becomes acted on between the horny sole and the heels of the coffin bone. This disease is equally produced whether the pressure arises from the horn of the sole

or the horn of the walls; and it is from the pressure of the walls of the heels bruising the sensible sole that corns are so common to contracted feet, and also to weak hoofs. It is also to the increased weakness of the inner wall and heel of the hoof that corns are so much more frequent in the inner than the outer heel; and from the superior strength of the hinder heels arises their little liability to them. But though the contraction of the walls of the heels does often occasion the complaint, yet it is much more frequently the consequence of pressure of the sole, the very form of which shews that it never was intended to be thus acted on; for the crust meets the ground, and the sole recedes from it in every part; consequently, whenever pressure does take place on the sole, it is unnatural, and produces injury. The general mode in which injurious pressure is applied to the sole is either by an improper form of shoe applied, or by not removing the horn opposed to the seat of corns, or by neglecting to renew the shoes themselves at proper intervals; and to one or other of these errors most corns may be attributed.

Bad shoeing operates in various ways, but in none more commonly than by the thickened unequal heel of the shoe, which is in general formed into a sort of clubbed end that prevents its presenting a level surface towards the foot; on the contrary, a bulbous projection *indents* itself into the very part, as though purposely placed there to produce this injury. The custom also of making the seat of the shoe slant inwards, is, I believe, sometimes productive of corns, by forcing the crust to press on the sensible sole laterally. Neglecting to prepare the foot for the shoe is also a fruitful source of corns; for that part of the horny sole that fills up the acute angle between the crust and bars, the pressure on which is so injurious, is, in a state of nature, protected by the prominences of the frog and bars, as well as by the slanting direction of the latter; but as artificial habits alter the shape of the foot, this part becomes exposed; and, therefore, in preparing a foot for the shoe, this angular portion should be so pared as to remove it from contact with the iron, without weakening the horny covering of the sensible sole. For so surely as this part becomes subjected to pressure for any considerable length of time, so surely extravasation takes place, and a corn is formed, and this more quickly when the heels are weak. The third common cause is the neglect of removing or renewing the shoes at proper intervals. When a shoe has been long worn, the growth of the hoof carries it forwards, by which the parts originally opposed to the heels are carried beyond them, and now press on the sole, often becoming indented within the line of the crust, and producing a most injurious pressure. Sometimes, also, either from the original form of the shoes, or by long wear, they become loose and *springy* at the heels, as smiths call it; in which cases gravel is apt to make its way between the shoe and foot, and, by the pressure of the heels during action, is indented into the substance of the horn; other gravel becomes received in the same manner, which presses the first still onward, till at last it meets the sensible part. As soon as it reaches here, inflammation ensues, and a very different com-

plaint is formed to that of common corn; for in every instance of this kind suppuration proceeds, and the matter, unable to make its exit below or sideways, forces its way upwards, and a small tumour appears at the coronet, which breaks and discharges a purulent matter. The treatment of these cases is referrible to the rules laid down for pricks, and in nowise differs from what is there described.

But the common effects of pressure from long-worn shoes, are the extravasation of a little blood, which, on paring away the horn at the angular point of the heel or heels, appears as a black or red speck, as the blood has been longer or more newly thrown out from its vessels; and it may be followed with the paring knife to its source in the sensible part. If the injury has been considerable, this blood itself may irritate and produce suppuration in a similar manner with gravel. But in general cases this extravasation remains unchanged, and, unless attended to, a weakened action of this part of the sole becomes permanent, and blood continues to be thrown out ever after upon any occasional renewal of the pressure. In such cases the horn itself over the part proves a source of future irritation, and therefore horses with old corns only go well when fresh shod and newly pared; for as soon as the portion of sole between the bars grows to a level with the surrounding horn, the sensible sole receives a fresh bruise, and lameness again appears. It is by contemplating this possible termination of corn, that the law has wisely considered every horse with this complaint as unsound.

Treatment of Corns.—When a corn first appears, it is not difficult by proper means to remove it completely; but when it has existed some time the injured parts become weakened, and the diseased action of throwing out blood, instead of secreting horn, becomes familiar to them. As soon, therefore, as it is discovered, the cure should be immediately attempted; first, by removing with a fine drawing knife every portion of diseased horn around, and the whole of the extravasation likewise, avoiding, however, to wound the sensible sole underneath. Having done this, introduce any caustic liquid, as butter of antimony, into the opening, which will act on the sensible sole by destroying the unsound parts, and by stimulating the remainder to a healthy secretion of horn. If any contraction of the heels is present, they should be slightly thinned to relieve the pressure; and, without this, it is probable a cure will be in vain hoped for. A shoe should be then applied, properly chambered opposite the weak part; or a bar shoe may be used, laid *off* the heel or heels, and taking its bearing on the frog. In a week's time, or less, the part will have gained sufficient strength, when the horse may be turned out; but, during this interval, introduce every other day a small pledget dipped in the escharotic liquid used, as butter of antimony, a solution of lunar caustic, potash, &c. &c. (see *Caustics, Mat. Med.*) After the horse has been to grass a month or six weeks, if the meadow is tolerably moist, and the feet are naturally strong, remove the shoes, pare the horn lightly away from the seat of corn, not however sufficient to weaken the support, and then put on tips; but if it has taken place in heels naturally weak and low,

continue the bar or chambered shoe. In this way corns may be permanently cured when not of too long standing.

But when the derangement of this part of the sole is become habitual and permanent, *a palliative* treatment only can be pursued. In the first place, the pressure of the horn must be guarded against by a regular and frequent paring out of that portion between the inflection of the heel; and if the hoof is very strong, and at all disposed to contract, the quarters also should be attended to, and not allowed to become too high or too thick. I have also in very strong feet found the use of a short shoe sometimes of the greatest service; but to a weak foot either a chambered or a bar shoe is preferable. When the weakness is very considerable, or the corn a very bad one, a bar shoe is the most proper support, and should be constantly used; remembering in these aggravated cases to remove occasionally all the surrounding horn likely to press on the injured part, at the same time taking care to let the frog rest on the bar of the shoe. And whenever such a horse is shod, it is proper for the corn to be dressed with some active stimulant, as the butter of antimony; by doing which regularly when shod, and about once a week also in the intermediate times, I have rendered horses, before useless, able afterwards to work with comfort to themselves and satisfaction to their owners. In slight cases of corn, the shoe proper to be used is one of rather more substance than common, with the web a little wider than usual, and its width equal throughout, that is, as wide at the heels as at the toe; it should also extend rather farther back than it generally does, and present a perfectly level surface. This shoe will afford ease and protection: future pressure must be avoided by keeping the seat of corns clear from offending horn.

THRUSH.

Some pains have been taken to trace the source from whence this unmeaning term arose. Two centuries ago it was called *running Frush;* and, as before that time, in some of the very old treatises on farriery, which borrowed much from the French, we find it named *running Fourche,* it seems to be probable that it really did take its name from fourche, the French term for the frog, gradually corrupted into its present appellation of *running thrush.* This complaint consists in a diseased action of the sensible frog, whereby, instead of secreting horn, it produces pus, which escapes out between the cleft of the horny frog. It is very improperly considered by many as a matter of trifling import; but a little experience only in the diseases of the feet will shew that it is of the most destructive tendency. Still more erroneous is it to suppose that thrushes can possibly do good by drawing off humours; or that there can ever be any danger in stopping them. On the contrary, there never was a *harmless* thrush,

or one that could exist long without doing great injury, by laying the foundation for contraction of the foot in which it existed, by the inflammation and heat exerted on the parts around. Various proximate causes produce thrush; the remote one is always inflammation of the sensible sole. Contraction, though a very common origin, is by no means the only one, for we observe them frequently in the wide open feet of very young horses, in which cases they appear to originate much in the same way as swelled legs, &c., by accumulation, or a determination of blood to the feet, from general plethora, which, occasioning inflammation, thrushes form. In many other instances their origin is to be traced to the application of moisture, particularly of *acrid* moisture, as that of dung, urine, &c., which, soaking the horny frog, at last penetrates it, and then becomes a source of irritation to the sensitive frog underneath. This effect of moisture accounts for the increased tendency of thrushes to affect the hinder feet in some instances, while the fore feet remain perfectly free from them.

Contraction is notoriously a common cause of thrushes; but they are by no means necessary consequences of it, seeing many contracted feet are without them, though many more are with them; which is not difficult to account for, when we consider how likely it is that the inflammation accompanying painful contraction should extend itself to the vascular sole. The different actions of secreting organs are here strikingly exemplified. The inflammation attendant on contraction stimulates the laminæ and the vascular sole to an extra secretion of horn; but the same inflammation applied to the vascular frog diminishes the secretion of horny frog; and it is farther remarkable, that although the contraction may be removed, it is not often that a *full* secretion of horny frog readily again takes place. As contraction is a very common cause of thrush, so it is equally certain that a long continued thrush always ends in contracting the foot; and which is one of the few instances in which a complaint may be both a cause and a consequence. Neither can any horse be considered *safe* that has a thrush, for there is always some degree of tenderness felt; and, in these cases, if the point of a sharp stone at any time should penetrate the cleft, or any of the sinuses occasioned by the complaint when considerable, the horse will sometimes come to the ground at once from excess of pain.

The appearances of thrush are sufficiently known: when mild, the matter escapes only through the natural cleft of the frog; but when it has existed some time, and affected the sensitive sole throughout its whole surface, all the fissures of the horny frog produce a purulent discharge of a peculiar fœtid smell; and such cases, if unattended to, particularly in the hinder feet, may degenerate into canker.

Treatment.—Thrushes may be always considered as local complaints; and it is not only impossible to do any harm by stopping them, but it is absolutely necessary in every instance to do so. In that kind we first noticed as sometimes taking place in the open feet of young horses, who, fresh from grass, become suddenly subjected to confinement, it will perhaps assist the cure if the plethora of the

constitution is attended to; but in all other instances the treatment should be at once wholly applied to the affection. When thrushes are connected with a contracted state of the feet, it is evident that a removal of the irritating pressure of the walls of the hoof is necessary to a radical cure (see *Contraction*). When moisture has been the exciting cause, it should of course be carefully removed, and its occurrence again prevented. But this caution must not operate as a means of denying the application of moisture to the feet in ordinary cases, either as a prevention, or as a cure of contraction; for it is sufficiently easy when necessary, to guard the frog against the effects of wet, and yet to apply it to all other parts of the foot; for when all the fissures of the frog are dexterously stopped with tow, charged with some oily astringent mixture, no moisture will penetrate to the sensible sole.

The present stoppage of thrush is seldom difficult, but to prevent its recurrence is not so easy always; for the parts having once taken on this action, easily fall into it again. Almost any astringent substance will check the suppurative action of the vascular sole, as *Friars balsam, tincture of myrrh, solutions of vitriol, alum, lead,* &c., which may be all usefully applied for this purpose. Tar and salt mixed is also a good application, or tar and bole armenic; but perhaps the following combines the good properties of all in a very considerable degree:—

Prepared calamine (*ore of zinc*)	half an ounce,
Verdigris (*subacetate of copper*)	ditto,
White vitriol (*sulphate of zinc*)	one dram,
Tar	three ounces.

Mix.

Before the introduction of this, the frog should be inspected, and all the decayed hardened parts, concealing underrunnings and sinuses, removed; so that the introduction of the mixture may be facilitated, and the disposition to harbour filth and moisture prevented. The whole frog may then be very properly smeared over with the mixture; but more particularly, a small piece of tow should be charged with it, and by means of a skewer, or other similar instrument, pressed to the bottom of the cleft of the frog, and also into every other fissure that may exist, as at the lateral parts where the frog joins the heels, where sinuses very commonly form in cases of bad thrush. Care should be taken, when introducing the tow, to do it neatly, so that no parts hang out, by which means the dressing will remain secure two or three days; but no application simply poured in, without the aid of some other substance, as tow, soft sponge, wool, or rag, which retains the application and guards against moisture, will answer so well. In bad cases the dressing should be repeated every day, in others every other day, or twice a week; but in all it is of import, as a guard, that the cleft should never be without the intermediate substance employed.

When it becomes necessary to turn a horse out to grass with thrushes, and which is often the best means of cure, it is of conse-

quence to remember that this treatment should be equally actively pursued during the time the horse remains out, otherwise the moisture applied will aggravate the evil; but if once a day, or at least every other day, a pledget of soft sponge or tow, charged with the mixture, is introduced, so as to leave no hanging parts without, it will remain free from danger of escape, unless the frog should be in a very diseased state, in which case the tow should be fastened in with cross bars, as in canker; or a bar shoe may be put on, and the dressing applied under it. These precautions also are necessary when thrushes exist in feet operated on for contraction, and where the treatment requires continual moisture to the general horn, but the absence of it for the frog in particular.

SANDCRACK.

[*Seime.*

This is a solution of continuity between some of the horny fibres of the hoof, generally in a direction parallel to their growth; that is, from above downwards. Now and then, though but very seldom, these cracks exist in an horizontal position. The term *sandcrack* has been said to arise from the dirt or sand usually observed within the fissure, which is supposed to be its cause: but this is erroneous; for absurd as are many of the names of diseases in the old nomenclature of farriery; this has a more significant origin; and is called *sandcrack*, because it was formerly supposed peculiar to hot *sandy* districts, the heat of which, applied to the feet, gave them a disposition to *crack* thus. These fissures are more common to the fore than to the hind feet, not but that the latter are sometimes affected with them, particularly of cart and other heavy draught horses; in which cases they are most generally observed in the front of the hoof; whereas in the fore feet they are more usually situated towards the inner or outer quarters. I have, however, seen sandcracks in the front of the fore feet. In every instance, where it is not occasioned by some outward injury to the hoof, it is, I believe, brought on by a brittle state of the horny fibres; the effect of some of the same causes that operate in producing contraction, with which it is very nearly allied in origin; for it is very seldom observed but in such hoofs as have undergone some unfavourable alteration in form, in which the horn, having taken on a diseased brittleness, does not readily yield to the daily contraction of the walls, but some momentary application of force suddenly disunites a portion of its fibres.

The fissure is not always of a determinate depth, being sometimes so superficial as not to penetrate the whole thickness of the horn, and occasioning no inconvenience at first. At others it exactly extends through the horn, but does not divide any of the sensible parts underneath: while sometimes again a lesion of some of these takes

place. Neglect, and a continuance of work, will, however, commonly bring any case from the slightest into the most aggravated state. When the hoof is completely penetrated, it becomes a most painful affection, and productive of extreme lameness; for the divided edges of the horn are apt during exercise to admit the protrusion of the soft parts underneath; which becoming suddenly pressed on by the approximation of the horny edges, exquisite momentary pain is produced. From the injury done to the sensible laminated expansion, there is often a sprouting of fungus between the divided edges, which greatly aggravates the complaint. Accidents of all kinds, injuring the vascular origin of the hoof around the coronet, may occasion sandcrack also, as treads, stubs, &c.

Treatment.—A very different curative plan is proper to be pursued, according to the state in which the complaint may be found. The grand object must be to interrupt the communication between the crack and the sound horn, which will otherwise take on the fissure likewise: and when it occurs in a hoof evidently contracted and brittle, a radical removal of the evil will be best attempted by reducing the resistance of the horn, and by correcting its contractile tendency, by the means recommended against contraction, such as a moderate thinning of the quarters, and the application of *future* moisture, after the edges of the fissure have been brought completely together.

Much difference of opinion has arisen as to the best mode of destroying the connexion between the divided and the sound horn. Some prefer the firing iron, others the rasp; while Mr. Budd, an ingenious veterinarian, but not long established, abuses all the usual methods in a most unqualified manner; and contents himself with much enlarging the opening; destroying the fungus when it arises; and afterwards keeping it down by pressure; and, when this lengthened treatment is finished, he lets nature grow it out. If this is *simplifying* the cure of sandcrack, or if this is the new and efficient method, I must yet adhere to those I have so long tried, and never yet saw fail. Mr. Budd is also a little severe on Mr. White's method of *firing* the fissure, by which *a glue-like matter* becomes an artificial and *temporary* bond of union till new horn is formed, and the opening closed by ultimate connexion. Mr. White does not appear to me to expect more than this; nor do I think it can be gathered, that he expected this glue-like matter to come from the *horn;* but, from the stimulus afforded, it springs from the secreting surface below: and if this plan at once destroys the fungus, and plugs up the opening, it must be a good one. It should be also remembered that, in country practice, a quick mode must often be adopted; the patients lay wide, and are not all of them daily under the eye of the practitioner. This plan of Mr. White's is not, I confess, the one I prefer, but I have seen it very successfully practised.

When a sandcrack is the effect of injury done to the coronet, the rising edges of the horn must be reduced almost to the quick, and the whole of the surrounding portion also thinned. Having done this,

draw a line of sufficient depth, not to penetrate the quick, across the inferior limit of the crack, either with a drawing knife, rasp, or firing iron; which will prevent the further extension of the fissure. After this, bandage up; but if any inflammation remains in the original wound of the coronet, do not bandage tightly over that.

In the usual cases of sandcrack, the state of the opening must be first carefully attended to. When, either from pressure, the original depth of the injury, or when dirt has got into the wound, and suppuration has taken place, were an attempt made at once to close and bind up the opening, very extensive mischief would be the consequence. In such cases the hard edges of the horn should be first removed, and the surrounding portions thinned considerably; after which the opening should be dressed with a pledget of tincture of myrrh with aloes, friars' balsam, &c. &c.; and over this another thick pledget spread with defensive ointment may be placed. If the irritation and inflammation are considerable, apply a poultice over all. In case of underrunnings and detachments of horn, the separated portions must be removed. But as this will seldom happen, consequently the removal of more than the edges is not often necessary. In a few days, by repeating a similar mode of dressing, the dirt will be evacuated, the parts will heal, harden, and become dry; when the process about to be recommended for common cases, without suppuration, may be proceeded on.

When a sandcrack appears that shews no signs of suppuration, although it has completely penetrated the horn, and a little blood or moisture has shewn itself at the edges; proceed to thin the hoof around it, and next, by means of a camel's hair pencil, introduce within the edges a small quantity of solution of lunar caustic, as ten grains to a dram of water; or butter of antimony may be used, though I prefer the former. Bandage the hoof up moderately tight for two days, then again examine the fissure; when, if the oozing is stopped, and no inflammation appears, proceed to draw a line of a moderate depth with a sharp firing iron, a very little above the upper limit of the crack, and another just beyond the lower limit also, and afterwards bandage as directed below. If preferred, these lines of separation may be made with a rasp, or fine drawing knife; but I have commonly chosen the iron, as I think the seared line of distinction stronger and more perfect than the rasped or cut one. But in case no moisture at all has appeared at the crack, and on examination with a probe it is clear that the fissure has not reached the vascular parts underneath; then the insertion of any caustic matter is unnecessary; the wasting two days for probable consequences is likewise equally so; and the *completion* of the treatment for the above state, and the *commencement* of the treatment for this, will be as follows.

The horse being shod with a bar shoe, and the hoof either pared away in a line with the crack; or otherwise the shoe chambered, so that the hoof immediately under the fissure may not press at all on the shoe (in a strong hoof the former perhaps is proper, in a weak

one the latter may be preferable); proceed to bandage up the foot, so as to fulfil the following intentions. Completely bringing the divided edges of the fissure together, perfectly retaining them there, and totally excluding moisture from entering the opening. Whatever mode will answer these purposes may be very properly adopted: perhaps the following, though a common one, is among the best. Melt some shoemakers wax, and smear all over the hoof; and, before it is quite cold, bind upon the wax neatly, evenly, and firmly, about three yards of tape, so as to include as much of the hoof as may be within the turns: fasten off with a hard knot, and again over the whole smear more wax, and lastly smooth it into an even surface. After all, rub over a little lard or other greasy substance to prevent the pitchy matter from sticking. The horse may now be turned out, which will be particularly desirable; or, if to be kept in the stable, he may be exercised every day by walking in hand. It remains only to remark, that as most of these cases take their origin from an altered condition of the hoof, so all the preventive means detailed under *Contraction* apply here after the recovery is completed.

PUNCTURED FOOT, OR PRICK.

The under surface of the horny covering of the foot is unavoidably exposed to numberless injuries from sharp bodies penetrating its substance, which may happen in various ways, from nails, pointed flints, glass, &c. The shoe being partly torn off, and then stepped upon, may produce it; but the accidental puncture by a nail during shoeing is one of the most frequent among these accidents. Injuries of this kind are proportioned in their effects according to the parts punctured, and not entirely to the depth of the wound: a knowledge, therefore, of the anatomical structure of the foot is necessary to enable us to form a prognosis, as well as to establish a proper method of cure. A puncture through the fleshy frog, even to the vascular portion, is not productive usually of such serious consequences, as an apparently more superficial opening made through the centre of the sole, which may penetrate the capsular ligament, and either produce anchylosis or destroy the animal.

Whenever a puncture takes place, of sufficient depth to penetrate to the bony connexions (which may be ascertained by examination with a probe), and synovia escapes, the *external* opening should be enlarged; but it should be attempted to close the *internal* opening at once, by the application of the actual cautery, not to the immediate surface of the capsular ligament, but to the skin directly over it. If, however, this treatment has been neglected, and suppuration has actually taken place, the cautery should be omitted: but the action of the part may yet be attempted to be altered by the application of milder stimulants introduced by means of a brush: as

diluted butter of antimony with oil may be lightly pencilled over the outer edges of the capsular orifice; on which may be placed a pledget moistened with tincture of myrrh, or tincture of benjamin, &c.; and any mild digestive can be laid over all as a defence. If the inflammation is considerable, bleed at the toe, and imbed the whole foot in a poultice.

A very deep posterior puncture may extend itself into the flexor tendon or its sheath, and is always productive of very great irritation and inflammation. In such case enlarge the opening, and if the wound is seen immediately after the accident, introduce any very mild stimulant, as the warm tinctures: but if the accident has occurred a day or two, and the inflammation is considerable, bleed at the toe, and place the foot in a saturnine poultice. When suppuration comes on, watch its progress, moderate the inflammation, give a free exit to the matter, and remove any horn that becomes detached. And as the life of these tendinous parts is inconsiderable, at each dressing a little of any of the above warm spirituous applications may be introduced, which will assist the healing, or, if a sloughing of any portion is unavoidable, will tend to assist its separation. A puncture of the sensible sole must be treated in a similar manner, remembering in every instance that *caustic* or *highly* stimulating liquids should never be introduced, as is often done, except under particular circumstances, which will be noticed. The introduction of tincture of myrrh, tincture of benjamin, or a mild solution of vitriol, &c., at the moment of the accident, is admissible; because it may gently stimulate the part to the adhesive inflammation; and if even suppuration is inevitable, the mildness of such applications cannot aggravate the process.

But the most usual cases of punctures are those which arise from a wrong direction of a nail in shoeing, in which it either presses on or actually wounds the sensible laminæ. This is commonly known to the workman at the time, by a peculiar sensation arising from the different resistance occasioned; or otherwise is detected by the flinching of the horse; when, if the nail is immediately removed, no ill consequences follow, unless the injury is considerable; and even in this case, were but a little common honesty practised, the serious evils that frequently follow these punctures might be commonly prevented. Were the nail immediately redrawn, the opening enlarged, and a little spirituous balsam of any kind introduced, it would very frequently heal immediately after; and even should it proceed to suppuration, still a depending orifice is made for the evacuation of the matter, and extensive detachment of horn prevented. But when a smith, in shoeing, considers the horse not actually *pricked*, though he may be conscious that the nail has taken a wrong direction, or is driven too high, he is apt, from laziness, to let it remain; and sometimes, even when he is aware that the nail has penetrated the inner surface of the horn, and wounded the vascular parts, he is even then not sufficiently candid to acknowledge it. The offending nail, therefore, even in such case, is allowed to remain,

and according to the extent of the injury, the inflammation becomes considerable the same night, or perhaps not till two or three days after. In such cases, as suppuration proceeds, the confined matter spreads around, detaching a portion of the fleshy from the horny sole, more or less considerable, and, at last extending upwards, it finds itself an exit by an opening at the coronet. In proceeding this course, the inflammation does not always confine itself to the parts nearest the exterior surface, as the sole and sensible laminæ; but sometimes, when not assisted by an artificial opening, it extends to parts less vascular, and whose action not being of that nature to make them immediately throw off the injury by forcing the matter outwards (as is done by parts more vascular), sinuses form inwards, and the disease then becomes *quittor*. Fortunately, however, the vascular action of the sensitive sole and laminæ being extreme, the matter usually proceeds outwards, and finds an exit at the coronet.

It may therefore, in pursuing this subject, be stated, that at any time when a horse becomes lame within a week after he has been shod, if the origin of it is hid in any obscurity, the shoe should be always first removed, and the foot gently struck all over with a tap of the hammer. If the lameness springs from this source, and any part is injured by one nail in particular, at that part the stroke will occasion the horse to flinch. If this fails to detect the evil, pinch the toe and quarter round with the pincers, which, if the mischief arises from a prick, will readily point out the affected part by the pain felt there; and under this spot matter will have surely formed. Proceed in such case immediately to pare away the horny sole till it is very thin, when, on close inspection, if the paring is done within two or three days from the prick, a dark coloured fluid will ooze from one of the nail holes, but, if a longer period has elapsed, a purulent matter will appear. By a proper opening evacuate this, and then carefully examine the extent of the injury by the probe, as how far the fleshy and horny soles have become separated from each other, for to the same extent must the horn be removed; not, however, taking the whole away the first day, but completing the removal the second. No greasy matter should be applied over the denuded sole, but a pledget of lint, slightly moistened with friars balsam, or tincture of myrrh, may be laid on; and any mild defensive dressing may be applied over this.

When the matter has proceeded to evacuate itself by the coronet, exactly a similar plan must be pursued; the original wound below should be traced and opened, so as to give a free exit to the matter. And in all these cases, when the symptomatic fever rages high, bleed, give physic, and treat in every respect as under inflammation. Perfect quiet is absolutely necessary in every instance of puncture; the slightest exercise irritates, and should be avoided. A shoe should be made so as to *lay off* the injured parts, and should only be very lightly tacked on with four nails unclenched.

TREAD, OR OVERREACH.

A WOUND about the coronet is a very common accident to horses, from one foot being set on the other, when the outer margin, or heel of the shoe, will wound the integuments, together with the vascular coronary rim. Or it may occur from a blow inflicted on the heel of the fore foot by the hinder one overreaching it. In the first instance, all these cases are to be considered as simple wounds, or rather as lacerated bruises, which, if extensive, have produced death in the surface and adjacent parts of the tread; in which some inflammation must occur to remove the edges thus injured. In no instance, therefore, should the irritating caustic applications of the farriers be applied, by which more extensive inflammation and an increase of sloughing are produced. On the contrary, wash with water to remove dirt, &c., apply a pledget of tincture of myrrh, or tincture of aloes, or friars balsam, &c.; and, if the wound is considerable, wrap up the whole in a poultice; if not, apply over it a simply defensive dressing, and bandage lightly up. Should the injury be slight, it may be healed at once by the adhesive inflammation; but if not, a moderate suppuration only will occur. Under some circumstances, however, more extensive mischief will follow, when the case comes to be considered under the subject of *quittor*.

QUITTOR.

[*Javart*.

THIS being a very destructive, and not an uncommon disease, has always occupied a considerable place in the farriers list. The older ones in all countries, impressed by the obstinacy of its character, had always employed very violent means for its cure, generally either caustics, or the actual cautery. The celebrated La Fosse, who was rather fond of novelty, in some measure overturned this practice in France, and introduced a new method, founded on an idea that the obstinacy and derangement that accompanied the complaint originated in the *cartilages* becoming diseased, which he affirmed were capable of being thus affected, but incapable either of exfoliating like bone, or sloughing like ligament; and therefore, that, to promote a cure, the whole of the lateral cartilage on the affected side must be removed. But his first premises were erroneous, for cartilages are vascular, and as such they must be capable of living action, though it is slow; and hence where disease exists, they will exfoliate like other parts. This practice of La Fosse was received into England with some avidity, and was still further propagated by

the late Professor of our Veterinary College, M. St. Bel. But the awakened attention to this interesting art at that time, and the assimilation of its principles with those of human surgery, soon exposed the fallacy of this treatment. The removal of so large a portion of hoof as was necessary to get at the cartilage for its extirpation, and the certain destruction of the coronary secreting surface, from whence alone a full secretion of new horn could spring, were most fatal objections to this erroneous method of treatment.

In the generally-received acceptation of the term among intelligent farriers, every wound of the cavity of the foot is not strictly a *quittor;* but to deserve this appellation a wound must have existed some time, and have taken on a peculiar unhealthy state, by which the ulcerated surface produces a diseased secretion, that spreads the same action around; and instead of proceeding outwards, communicates itself inwards in various directions. In surgical terms, these tracts of ulceration are called sinuses; but by farriers are very generally termed pipes.

The internal parts of the foot have very different living powers, and hence are very differently affected under disease. When an injury happens to the integuments only, to the sensible laminæ, or the other *highly vascular* parts, our only care is to lessen the irritation, when their vascularity quickly works their own reproduction. But when the injury extends to the ligamentous and cartilaginous parts, their living powers being small from their diminished vascularity, a very different complaint is formed, and a very different mode of cure required. And it is upon a proper consideration of these immediate points, that every thing that is salutary in the system practised depends, and upon an improper consideration of them, every thing erroneous has been founded.

It is now well known why parts of little vascularity, when diseased, require stimulating, and sometimes very actively; for it is necessary first to destroy the diseased surfaces, and then to excite the healthy ones, to enable them to throw off the destroyed portions. Formerly, as we have noticed, either the actual cautery or caustic were the means employed for this purpose, though the practitioners were unaware of the rationale of their operations. Of later date the knife has been used by some to dissect away the diseased surfaces, and, by a supposition of bringing the part into the state of a simple wound, to promote a natural cure. But very weighty objections lie against this mode of cure. Its very premises are wrong; the simple excising of organs, so little vascular as those affected in confirmed quittor, will not bring the part into the state of a simple wound, that is, of such a simple wound of soft parts as may usually be expected to heal at once: to which healing process there is often another objection, from the difficulty of exactly removing the whole of the sinuses with a knife; and it is well known, that if any of these are left unexcised, the disease is not subdued. It is further ineligible, from the great danger of wounding the capsular ligament in making the necessary sections,

particularly where the sinuses run inwards. Were these not sufficient, the destruction of horn, and the separation of so large a portion of coronary ligament, would be most serious objections to the cure by the knife on ordinary occasions. Against the fire also much may be urged, but which is unnecessary, as it is seldom now employed; consequently nothing is left for us but the stimulating plan.

Mr. Budd, whose late publication on the feet I have before had occasion to mention, from that attachment to novelty that so clearly runs through the whole of his otherwise very ingenious work, condemns the usual treatment of quittor as established among the best veterinarians, in the same unqualified manner that he criticises every other mode in use for the cure of foot diseases. He attributes all the evils that attend this complaint, first to the motion of the foot allowed in exercise, and next to the introduction of corrosive substances. Instead of which he recommends the application of poultices; and, in very bad cases, he allows the injecting of the sinuses with a solution of sulphate of zinc (*white vitriol*), one dram to four ounces of water. Happy would it be for this noble animal if these mild means would indeed cure *quittor;* but this apparent simplicity, and humanity of treatment, are, I am fearful, wholly deceptive, and, in most cases, would entail a complex case on the operator, and a long and painful suffering on the animal.

I have before stated, that a wound into the cavity of the foot only becomes a quittor when it has taken on a peculiarly diseased ulcerative process, principally dependent on the parts it affects; for even though the ligaments and cartilages should not be first affected, yet they soon become so, and then the true character of the disease is produced and kept up also. In a great number of instances the cartilages are at once wounded by the injury sustained from treads and bruises on the quarters. But most of those cases that afterwards become quittor are at first only simple wounds or bruises inflicted on the integuments, which would readily heal with mild treatment; but, from being considered in another point of view by ignorant farriers, are dilated and stimulated, until deeper mischief is produced. It is of these circumstances, and of these cases, and which every veterinarian already treats merely as a tread or a bruise, that Mr. Budd appears to have availed himself to decry the alledged treatment of supposed quittor, as well as to condemn without reserve the use of *active* means for the cure when it really does exist. Every humane veterinarian will wish with him that this complaint could be cured by less painful modes, but which his experience convinces him cannot be done.

Quittor may have several origins—pricks from shoeing, or other punctures, as we have pointed out, oftentimes occasion it; an overreach also: but with draught horses the most common cause is a bruise or wound inflicted by a tread on the coronet; the high calkins of their shoes prove particularly mischievous on such occasions. Any part of the upper margin of the foot is open to this accident, but one of the quarters is most usually affected; and as the injury is

commonly considerable, so the lateral cartilages are often at once wounded; and if not, the bruise, being such as to produce death in a portion of the surrounding integuments, and other vascular parts, as the coronary expansion, &c. so extensive ulceration commonly follows, and, the dead portions being thrown off by the inflammation, farriers say a *core* has come out.

At this period of the complaint it is, however, evident the disease should be treated in no respect as a confirmed quittor, but simply as a wound or abscess; and it is to a different consideration of the subject that many of the future evils result; for farriers are too apt on these occasions, under an idea of assisting the *coring out*, to introduce strong stimulants, the inflammation excited by which actually occasions the evil they intended to prevent; for the less vascular parts then take on the disease, and sinuses immediately proceed to form. Until therefore the full operation of the immediate injury shews itself, and until there are evident appearances of unhealthy action, with an actual formation of spreading sinuses, apply no stimulating applications internally; on the contrary, use every means to reduce inflammation. Thin the surrounding horn, and if the matter appears to penetrate in a direct line downwards, make an opening in the hoof below; but in other cases merely dress in the mildest way, and place the whole foot in a cooling poultice. Avoid motion, even of the slightest kind, and use other means of combating inflammation, as bleeding, low diet, and internal remedies.

Treatment of confirmed Quittor.—But when the complaint has fully established its character, then it can no longer be considered as either a simple bruise, wound, or abscess, but must be regarded as an ulcer composed of diseased branches, called sinuses or pipes, more or less numerous; and which ulcer has been attempted to be cured by means more *apparently* consistent with the modern forms of surgery; but, after all, no method has been found so *generally* successful as the long established practice of *coring it out*, which is nothing more than, by an escharotic process, to destroy the ulcerated edges and surfaces, and by raising a strong inflammation to produce a new and healthy action. Farriers have, however, fell into another error, from observing that, under some circumstances of bad quittor, a portion of ossified lateral cartilage has come away; and as this is by no means an uncommon occurrence, it leads numbers of them to consider the existence of a portion of offending bone in every instance as a part of the disease; and until they can produce a separation of a part of the lateral cartilage, which they consider when it appears as the very *quittor bone* they sought for (and which exfoliated portion being often ossified strengthens the opinion), and until this appears, they are not contented, but prolong the treatment to produce the desired end. But nothing can be more erroneous than such a consideration of the matter: the promoting a healthy action is all that is necessary for the removal of the diseased portions, and the re-establishment of the healthy.

The first necessary step to the cure is a careful examination, with a

blunt leaden probe, of the extent of the ulcer, with the number and direction of the sinuses or pipes. Should any one of these proceed directly inward, and the instrument meets a firm hard body, it is more than probable that the bone is bare, when the prognosis must be extremely unfavourable; not but that portions of the coffin bone have exfoliated, and the case turned out favourably; but more frequently the reverse is experienced. When the capsular ligaments become ulcerated, and the joints exposed, the case is always hopeless; the excess of irritation usually soon destroys the animal. The cartilages of the foot are commonly exposed, and sinuses run beyond them; but when these take an *inward* direction *behind* the cartilages, the case may be considered as an aggravated one also. When, on the contrary, the direction of the principal sinuses is outward, and downward, or backward, towards the heels, the cure will not probably prove difficult. It should be remembered that we must not be misled by the smallness of the external opening, which is often by no means commensurate with the internal extent.

From what has been before enlarged on, it will be evident that any of the substances that act by their causticity may be introduced to promote a removal of the diseased surface, and a more healthy action of the remainder, or, according to the farriers, to *core out the quittor*. Crystallized verdigris, corrosive sublimate, butter of antimony, arsenic, solutions of potash, and lunar caustic, are all in use for this purpose. One circumstance is self-evident, which is, that humanity as well as prudence dictates that we should use the mildest means first. It too often fails; but in every instance where the sinuses can be reached by a syringe, the cure should be attempted by injecting for a few days with a tincture of cantharides in turpentine (see *Liquid Blister*), or a mild solution of caustic alkali or lunar caustic, introducing pledgets also, dipped in the same, by means of a probe. But if these fail, it will be prudent to proceed to the use of more active stimulants. When the upper opening is very small, and the sinuses deep, but contracted, make a paste with equal parts of resin and sublimate, softened with tar. Impregnate small pieces of wool fully with this paste, which place around the end of a probe, and introduce one by one, to the bottom of each sinus, filling also each up to the orifice with the same, but not jamming them in with force. When, on the contrary, the superior opening is sufficiently large, and one or two straight sinuses only exist, a bougie may be made with paper, dipped in the paste, and introduced; or in case the diseased action is extreme, and, as a farrier would express it, the quittor is very *foul*, a powder composed of equal parts of resin, sublimate, and verdigris, may be rolled within thin paper, so as to make also a bougie, which being greased or rubbed with tar to render it slippery, should be introduced to the bottom of the sinuses; but it must be remembered, that when these are numerous and irregular in their direction, the first is by far the best mode. The hoof should be thinned, and may also be put into a poultice; and, in some cases, where

there is a very extensive separation of horn, and the direction of the quittor extends completely from above downwards, a removal of that portion of hoof, with a drawing knife, is proper, by which the diseased surfaces can be exposed and dressed; but under no other circumstance is an extensive removal of horn prudent.

In two or three days after the introduction of the caustic, there will follow great heat and tumefaction of the foot; and, at last, the orifice will burst out, expelling the slough, together with the application that occasioned it; after which it may be expected that the wound will go on healthily to heal. If however, unfortunately, this should not be the case, recourse must be again had to the same means.

CANKER.

[*Fic, ou Crapaud.*

From the great vascularity of the internal parts of the foot, and likewise from the nature of their office, many of them being secreting organs, the inflammations that occur in them prove, in progress and effect, altogether different from those that take place in other parts. Their vascularity greatly heightens the violence of their inflammatory actions; and, from their secretory structure it happens, that when they become inflamed, a great increase of parts arises; which is never of a healthy nature, but commonly compounded. Our present subject is a strong instance of this: *Canker* is a very obstinate and destructive disease, and may commence in any of the vascular parts of the foot; but the perfect character of the complaint, and its future progress, consist in a separation of the horn from the sensible parts, by a suppurative process, together with a sprouting of a luxuriant peculiar fungus from all the secreting surface that is exposed, and which is found very difficult to keep under.

The disease may be brought on in various ways. A very common origin is from neglected thrush, in which the suppuration, extending beyond the sensitive frog, inflames the vascular sole, and extensive ulceration succeeds. Virulent and neglected grease will sometimes occasion it, and in both these ways it is frequently engendered among heavy cart horses; particularly where many stand together in crowded and confined situations, as those of coal-porters, brewers, &c. &c. Here they become greased and thrushy from wet and neglect, and canker soon follows. It often likewise arises from pricks, and when such an injury extends to the flexor tendon, and canker is the consequence, it is commonly of the worst kind; though more frequently the unfortunate animal, under such circumstances, is previously cut off by locked jaw, or by the hectic arising from the extensive sloughing. Treads, bruises, or bad

corns, may now and then likewise occasion it. It is but seldom met with in the fore feet, and when it does occur in them, for obvious reasons, it proves more manageable. It does not often, like quittor, extend to the bones, cartilages, and capsular ligaments; but confines itself principally, except when the flexor tendon is wounded, to the vascular frog and sole. It will now and then, however, either by its own violence, or by bad management, extend even to the bones; in which cases it will be most prudent to destroy the animal.

Treatment of Canker.—The principal indications appear to be, first, to reduce the inordinate increase of parts to a level with the surrounding surface; and, next, to restore the healthy secretions. When the fungus extends itself considerably beyond the horny opening, it is prudent at once to remove it to a level with that by the knife. This will occasion a considerable hæmorrhage, which may be checked by touching it lightly with butter of antimony, or other escharotic; after which, the edges of the horny sole that surround the opening from whence the fungus arises may be got at. Proceed carefully and accurately to examine what extent of sensible sole is separated from the horny sole; or, as a farrier would say, how much is underrun. Exactly to this extent must the sole of the hoof be removed with a drawing knife; for it must never be lost sight of, that the horny sole once separated never reunites, but becomes a foreign body, and, as such, occasions the same effects that occur from the presence of foreign bodies in all other parts, namely, irritation and an inflammatory process to attempt the removal of the offending substance. Every portion, therefore, of separated horn must be carefully removed. Not only at the first must this be done, but at every future dressing the same attention should be paid to examine if any fresh *underrunning* has occurred; or, in other words, whether the suppuration has extended to dissolve the continuity between the sensitive and insensible horn of other portions, which, in such case, must be treated in the same way, by a judicious removal of all the detached parts: and as the presence of the horn occasions irritation when it becomes detached *generally;* so any immediate portions of the edges of it that project do it more *particularly;* therefore it should be always cut away neatly and evenly, and no rough edges or prominences suffered to remain.

Having thus fulfilled the first indication, by reducing the diseased fungus, and having lessened the irritation that occasioned it, by removing the detached horn; the next process is to promote a more healthy action in the diseased surface: two plans tend to this end—the first is, by *stimulants* applied to the surface of the vessels particularly; the second, by *pressure*, which strengthens them generally. As long as there is a profuse secretion of a curd-like whitish matter; and as long as the fungus sprouts greatly beyond the surrounding parts; so long the *cankered* action is going on, and, during this time, no secretion of firm horn will take place. An unhealthy formation of thin half-formed horn may be observed over many

portions of the surface; but this will prove an imperfect secretion, and must not be allowed to remain; on the contrary, it must be continued to be carefully removed at each dressing, until, by the application of escharotic stimulants, and the benefit of pressure, a healthy granulating surface appears, that will produce only an ordinate and proper quantity of good pus or matter, and finally end in the formation of sound horn.

After the exposure of the whole cankered surface therefore, and its treatment as before directed, let it be sprinkled with either of the following powders:—

No. 1.—Red precipitate . . . . . half an ounce,
Verdigris . . . . . ditto,
Calamine . . . . . ditto.

Mix.

No. 2.—Blue vitriol . . . . . one ounce,
Alum . . . . . ditto,
White lead . . . . . ditto.

Mix.

Being lightly covered with either of these, or any other escharotic stimulant judged proper, let it be dressed as dry as possible, by first laying lint on the immediate surface, and then place pledgets of tow thickly over the bottom of the foot, which should be done very judiciously, so as to fulfil the remainder of the indication; that is, to keep up a firm and equal pressure. To do this effectually, having filled up the whole cavity of the sole, introduce thin strips of iron or steel, slid under the shoe and crossing each other, which will retain the dressing and promote the pressure. This being done, wrap up the whole in thick sacking or hose, so as to keep the foot perfectly dry, which is of the utmost importance, as nothing so tends to the increase of the fungus and the exclusion of the suppurative process as moisture: nor does any thing so strongly prevent its future increase, and restore the healthy action, as dry applications, united with firm and regular pressure over the sprouting surface. A very great fault is often committed by dressing cankered feet too seldom. No case ought to be dressed less frequently than every day; and very bad cases should be opened twice a-day. From a wish to avoid trouble, this is often neglected, and a cure that might be easily performed is needlessly protracted; and, in the end, proves less complete than it might otherwise have been: for when the dressing is delayed, every thing that has been done is rendered nearly useless by the pent-up matter extending itself under other portions of the sole, and by the increase of the fungus.

Keeping in mind the beforementioned indications; the practitioner, at each future dressing, can be at no loss how to proceed. The luxuriant and diseased slough or fungus must always be first removed, not only to produce a level surface, but also to procure a complete view of the parts underneath; for it proves often a most insidious disease, and misleads unless carefully watched: sometimes,

while one part heals rapidly, another is extending as fast, and a third remains stationary. The destruction of the fungus, when very high and luxuriant, may be effected, as beforementioned, most conveniently by the knife; but, when not so prominent, it may be done by the application of any of the caustic and escharotic matters generally used. Butter of antimony is very commonly applied for this purpose; and as it can be laid on every part, and between interstices, by means of a small brush, where a dry substance might not reach; so, in this respect, it is preferable. It has also another advantage, which is, that, by turning the surface immediately white, it shews what parts it has been applied to, and what are left undone. The lapis infernalis, or caustic potash, from its quick action, is also a convenient application. I have also used a solution of lunar caustic, but the application of the same in substance is not sufficiently quick to be useful. The caustic dressing, be it what it may, should be continued no longer than there is any diseased surface remaining; nor should the escharotic process ever be pushed to the extent of corroding deeply into the substance of the vascular parts. Such conduct betrays the grossest ignorance, and therefore can hardly be expected in the veterinarian; but it has happened, in the practice of smiths and farriers, to the utter destruction of the foot. Yet, on the other hand, until the cankered matter, from being profuse, thin, and clotted with white masses, changes to a thicker, less fetid, and more healthy discharge, as well as one lessened in quantity, the sore is still a cankered one; and until the cauliflowered white fungus changes to a healthy red granulated appearance, the unhealthy discharge must continue: and, in all such cases, a due degree of pressure, united with the application of some escharotic, milder or stronger according to circumstances, may be considered as requisite. But as soon as the fungus is completely reduced, the discharge lessened in quantity, and become healthy in quality, with a sprouting of healthy horn apparent, then nothing more is necessary than to watch the parts, to dress dry, and sufficiently often; still keeping up a moderate degree of pressure till the sore is completely healed over. Horses are often turned out during the process of cure of canker; but as the foot becomes unavoidably exposed to moisture, it is hardly ever admissible, unless under circumstances of a very dry season and situation; and even then, particular care is necessary to guard against occasional moisture, by a more extensive application of defensive dry dressing.

FALSE QUARTER.

[*Faux Quartiers.*

This can hardly be considered as a distinct complaint, but, more properly, as a consequence resulting from some one of the former

diseases; in which, from the injury done to the coronary vascular ligament at one immediate part, it can never afterwards secrete horn in a perfect line of continuity; but the break or interruption which first originated between the old and new horns continues to be propagated. Such a blemish is called a *false quarter;* and it is evident, that it must greatly tend to weaken the hoof. It likewise sometimes produces the same unpleasant effects as a sandcrack, by admitting the vascular laminæ between the opening, and, by a sudden approximation of its sides, squeezing them, to the extreme pain of the animal. The *Treatment* can be only palliative. In cases where it is *likely to happen,* thin the horn thoroughly, and apply a blister: but when already formed, keep the horn of the part always thin: use a bar shoe, and *lay off* (as a smith calls it) that quarter, that is, the portion of crust immediately under the blemish must not rest on the shoe. This may be done either by paring the foot, or by an indentation in the shoe; the choice of which is left to the prudence of the operator, with this exception, that, in a weak thin foot, the alteration should always be made in the shoe.

Operations.

Of Shoeing Generally.

EVEN without the assistance of history, it would naturally suggest itself, that the ingenuity of mankind would be early employed in discovering some mode of counteracting the effects of pressure and abrasion on the feet of such horses as they had domesticated; for, as commerce and the liberal arts were encouraged among them, so the necessity of forming more easy communications with each other by means of paved tracks or roads presented itself; and which, as they occasioned an unnatural wear of the feet, it became necessary to counteract the effects of by some artificial defence. In very early ages *, a species of sandals were made use of for horses as well as men, which were formed either of leather, of matting, or of rope; but it appears that these were only in *occasional* use for horses. Xenophon, who commanded the cavalry of the Grecian armies about five hundred years before Christ, and who wrote expressly on the subject of horses, mentions such an occasional de-

* There is a learned work, written by Professor Beckman, expressly on the antiquity of horse shoeing. Mr. Bracy Clark has also a very ingenious chapter on this subject, to which I would refer the inquisitive reader.

fence for their feet in use in his time. In Columella and Varro, who were subsequent writers, we have additional evidence of this. Two hundred years after these, Apsyrtus, a famous veterinary writer who lived in the reign of Constantine, gives express directions for the treatment of bruises and galls of the shank, brought on by the thongs or fastenings of the *foot shackles* (*ippopedes*). At later periods, these shackles were strengthened by plates of metal, which, in general cases, were probably of iron, but, on occasions of great magnificence, appear to have been sometimes made of gold; as, we are told by Pliny, were those used by the mules of Poppæa:—

"Et supenum animum in gravi derelinquere Cœno
Ferream ut Soleam tenaci in voragine Mula."—CATULLUS.

But as riding, and the use of chariots, became more general, so some means for obviating the inconveniences of the inapt modes of fastening the defences for the feet then in use, presented themselves more forcibly; yet it is probable, that it was not till about twelve or thirteen hundred years ago, that the present method of shoeing with iron plates, and attaching the same by means of nails, was practised. Vegetius, who lived in the reign of Valentinian the Third, though he accurately enumerates every thing connected with an army forge, makes no mention of any apparatus for shoeing horses, nor any artificers for that purpose. And, from Beckman we learn, that the first account of the modern horse-shoe that can be relied on, is gathered from an account of the furniture of the Emperor Leo, of Constantinople:—

"Ferra lunatica cum clavis eorum."

But the use of shoes of this kind was very confined at this period; nor did, perhaps, any horse continue to wear such altogether, but now and then only; nor was it till long after their introduction, that the use of them became general. Père Daniel, in his Histoire de France of the ninth century, informs us, that the horses of his country were only shod in times of frost, or on very particular occasions.

The art of horse-shoeing appears to have been brought into *England* by William the Conqueror, having been previously some time practised among the northerns, who were skilful artificers in iron; and among whom the adapting of shoes to the feet of horses appears to have been considered as a very important matter; for we are informed, that this puissant monarch appointed Henry de Ferrers, a favourite who came over with him, superintendant of the shoers; and from hence the future Earls of Ferrers, his descendants, have always borne six *horse-shoes* in the quartering of their arms. But, neither in England, nor in any of the continental countries, did the art make a progress at all equal to its importance. It is true, that many writings, expressly on the subject, were produced; and French, German, Italian, and Spanish, treatises on shoeing, of very old date, are to be met with: there are a few English also, but which are mostly

borrowed from the French. Nevertheless, when the celebrated La Fosse began his career, the practice of this art was but clumsily managed; and his well-known writings on this subject appear to have first paved the way for the improvements that followed.

La Fosse's Shoe.—La Fosse considered long heavy shoes as useless, and liable to drag off; that they lessened the animal's points of support, and that thick shoe heels were no assistance to weak-heeled hoofs: he was hence led to recommend what he called the half-moon shoe, which was short, and reached only to the middle of the foot. This method was considered at the time as very ingenious; and his treatise on the subject was translated into our language both by Bracken and Bartlet, who each recommended the plan it taught, and from which its use became pretty general. But persons who try a new mode, fall into one of three errors. They either enter on it with a prejudiced mind, by which they are previously determined to find out only its defects; or they expect more than can be performed, and hence are disappointed and disgusted: or, otherwise, they embrace without prejudice the new mode; but, not recollecting that a *sudden* change, even from bad to good, may do harm; because the parts engaged cannot always accommodate themselves to the novelty; so, experiencing an inconvenience, they attribute it to the mode itself, and hence discard it. La Fosse's shoe has been found useful in many cases of diseased feet: it is very applicable to *strong* feet when contraction is likely to take place or has began, provided such horses are not worked on very hard roads. But this plan is not *generally* applicable to the majority of horses in the present state of our roads, for the heels are found to wear too fast: in hunting, horses slip with it; and, in draught work, it is still less admissible. This shoe, or one something similar to it, was also first adopted by Mr. Coleman, but, not being found to answer, was very soon abandoned. But with all its merits and defects, the half-moon shoe was not La Fosse's invention: it had been used for contracted feet more than a century before, but had never been brought into general wear; yet as it was found a *remedy* for contractions, La Fosse deemed it might, by general use, *prevent* them also; and hence it is probable arose his adoption of it.

But the present mode of horse-shoeing in France differs very much from that recommended by La Fosse; and as widely also from the plans in use among us. The French shoes present no fullering, but the heads of the nails, which are square, are received into a countersink. These nails go round the toe, and stand much more within the circumference of the shoe than ours; which leaves a projecting rim beyond the foot. On a superficial inspection, this contraction of the line of situation of the nails would seem to endanger the safety of the foot; but with them each nail is directed more upright than with us, and, consequently, comes out of the horn sooner. Their shoes are likewise not nailed so near the heels as the English, and the last nail is always the smallest. Thus far their plan presents much to recommend it; but, to mar the whole, the

web, which is very wide, is made concave above, and below convex, and the thickest portion is at the toe.

Osmer's Shoe.— Mr. Osmer was originally a surgeon, possessed of a strong mind, with great marks of originality. His *Thoughts on Shoeing* were offered about 1760. Osmer considered the bars and frog as essential parts, and particularly insisted on the propriety of that soft elastic part remaining uncut, the loose ragged portions only being removed. He likewise observed, that some persons, mistaking La Fosse (who blamed the improper cutting away the sole and frog), had gone into the contrary extreme, and suffered the feet to grow to a preposterous length. The feet of all horses, he remarks, ought to be pared according to their length; the crust being made perfectly plain and smooth around the outside. In strong feet this is to be done by paring, but in broad fleshy feet by rasping alone. The shoe he recommended was to be made quite flat on the under surface, of an equal thickness throughout its outer margin; and to prevent its pressing on the sole, it was to be seated; that is, bevelled away, not from the edge, but from about half its width, by which means it would leave a flat surface for the attachment of the crust. His further directions were, that every shoe should stand wider at the heel than the foot itself, and that every foot should be kept as short at the toe as possible, so as not to affect the quick.

Mr. James Clark's Shoe.—Not very long after La Fosse and Osmer had awakened the attention of the public to shoeing, Mr. Clark, of Edinburgh, published his excellent treatise on this subject. This gentleman's shoe did not materially differ from the one recommended by Osmer, and used by many of the most intelligent of our farriers at present: but his remarks more forcibly painted the improprieties generally practised. It is plain likewise that Lord Pembroke borrowed many of his ideas from him. Mr. Clark's principles rested on recommending no unnecessary paring or cutting either of the hoof or frog; nor did he allow of raising the heels with calkins, except in hilly countries; but when any farther stay was required, to use an ice nail.

Monsieur St. Bel's Shoe.—In consequence of the situation this gentleman held, every attempt he made at improvement excited the public attention; and though he was certainly not well informed with regard to the general pathology of the animal, yet he possessed many excellent ideas on the mechanical arrangement of the foot, and his principles of shoeing were ingenious. The late professor's shoe was intended to present a concave surface to the ground, that would more closely imitate nature, which mode he offered as entirely new; and though it is possible he considered it as such, yet the same form was as strenuously recommended three hundred years ago, in a treatise written professedly on the subject by Cæsar Fiaschi, an Italian. There is no doubt but that this mode of shoeing appears more consonant to the *natural* tread than any other, and therefore presents, *at first*, the firmest support to the under surface of the foot; but unfortunately it will not remain in this state long, for this thin edge will

soon wear down, by which means the iron becoming thin will also become weak, and thus prove liable to bend or break. If shoes could be so formed as to be at once ductile and yet durable, we might then advantageously use this pattern. The breadth likewise of Mons. St. Bel's web was less than that of the common shoe, and it was directed to be half as wide at the heels as at the toe. He also gave directions for the number of nails, and a table of weights for the several shoes; but it is evident no precise rule can be followed in either of these respects.

Mr. Morecroft's Shoe.—This ingenious professor of the veterinary art rendered himself eminent by his invention of casting shoes, or moulding them by means of machinery, which was done by sinking them in dies: but the plan was not found to answer, and the ingenious inventor lost some thousands by the experiment. Nothing can prove sufficiently tenacious but a shoe worked by manual labour. Mr. Morecroft, in consequence of the good effects he observed it to have upon feet in general, and from the simplicity of its form, recommended Osmer's seated shoe, which, as we have described, is one that has a flat surface opposed to the ground, but a concave one towards the sole, by which means all chance of pressure is avoided; but this concavity does not, in Mr. M.'s shoe, begin near the edge, as in the common shoe of country blacksmiths, but towards the centre, or from rather more than half of the width, by which means a flat surface is left as a seat for the crust. The heels are likewise directed in his treatise to remain the general width of the web. This shoe has been since adopted by General Bloomfield, who is chief director of the Prince Regent's stables, and whose known capability of judging in these particulars renders this adoption an additional proof of the general excellence of the plan; as it is also a pretty convincing testimony, that the College shoe is every day falling more and more into disrepute.

Soon after Mr. Morecroft's outset as a veterinary surgeon, he gave to the world, in a well written treatise, his principles and practice of shoeing; in which the advantages resulting from the use of this shoe are detailed. It would also be doing his ingenuity great injustice to omit noticing his remarks on cutting. When horses cut from turning out their toes, which he remarks is by much the most common cause of this evil, they are frequently observed to have the inner quarter of the hoof lower than the outer, by which the fetlock joints are brought nearer to each other than those of horses with their limbs straight. These facts have led farriers to a conclusion, that if the inner quarters were raised to a level with the outer, and especially if made even higher, the fetlock joints would be thrown farther apart, so that the foot in motion would pass the supporting leg without striking it; and accordingly it has hitherto been the custom to make the inner quarter of the shoe higher than the outer. Viewing this matter in another light, Mr. Morecroft first made trial of a shoe the reverse of this, that is, with the outer quarter thick and the inner one thin, and which was found to prevent cutting, very completely, in se-

veral instances. The principle on which this is supposed to act is, that when a horse is at rest he supports his weight equally on both feet; but having the inner quarter much raised, in the common mode of attempting to remedy the defect of cutting, when one foot is elevated he must be supported obliquely on the other, and hence feel liable to fall outwards; to prevent which, he brings the moving foot nearer the supporting one, by which he strikes it. Mr. M.'s plan, on the contrary, he argues, by elevating the outer instead of the inner side of the supporting foot, must necessarily give it a disposition to lean inwards, which will throw the moving foot *farther* from the supporting one. But ingenious as this mode of reasoning may be, it is to be feared that, by thus throwing an increase of weight on the inner side, we should sometimes be in danger of producing evils that would counterbalance the prevention of cutting. (See *Description of the Extremities*, and *Splent*.)

The Shoe of the Veterinary College.—The shoe first used by the Veterinary College was that recommended by Monsieur St. Bel; but when the present professor entered on his situation, he adopted another, which was not very different from that of La Fosse; a more extensive experience, however, convinced him, that this shoe was not applicable to British horses subjected to British travelling; he was therefore led to alter his plan, and to adopt another, which has given rise to much discussion, and has been very generally condemned, but which the ingenious professor still advocates the cause of, although he was doomed to witness its daily decline in the public estimation from the moment it became generally known. Wavering, therefore, between the pride of adoption and the necessity of dereliction, Mr. C. appears to have endeavoured to draw the public attention from the thin heeled shoe to one with thick heels, and a clip to rest against the bars, on which also we shall have occasion to remark.

The College Shoe, which has proved the subject of so much discussion, is three times as thick at the toe as at the heels; for it is alleged, that the wear is three times as great there as at the heels; and that the frog is by this means brought to the ground. It is likewise much lighter than usual; for it is observed by Mr. Coleman (though I think without much reason), that an ounce at the heels is more than a pound on the back. This shoe is, therefore, recommended on three principles: first, that by its use the wear at the toe will be equal to that of the heels; secondly, that the weight will be diminished; and, thirdly, that the frog will come in contact with the ground; which the professor thinks so essential, that this shoe is only one-third the thickness at the heel, to what it is at the toe. It is likewise left plain on both its surfaces, and in its application the toe should be pared down, but the heels left undisturbed; by which means the thinness of the shoe heels will not influence the horse in his tread.

In the professor's work on the foot we are also informed, that when the heels of the foot exceed two inches in depth, with a frog equally prominent, and the ground dry, a *short* shoe, and thin at the

heels, may be applied: but he does not recommend this shoe in wet ground. With regard to the nails, they are to be applied as near the toe as possible, with none at the heels; for when they are placed far back, they bind the foot in its action, and tend to contract it. The nails of the College Shoe were originally conical, and the nail holes stamped with a wedge-like punch, which farriers call countersinking; by which means, so long as any part of the base of the nail remains, the shoe is said to be held firm. A shoe and nails, for a moderate sized horse, should weigh from eighteen to twenty ounces; and the web may be an inch wide at the toe, and three-fourths of an inch at the heels. For a light saddle horse, the weight should be from twelve to fourteen ounces, and proportionally less wide. Cart horses should have an extension in breadth and thickness according to their size. In horses which hunt, or those used in shafts, it is proper that the outer heel be turned up; and that there may be no inequality of position, the outer heel of the hoof is directed to be lowered (but very erroneously, for both foot and shoe must be made by this means untrue), and the inner heel of the shoe somewhat thickened, which will prevent cutting, and yet allow the horse a firm support. The professor recommends a bar shoe for horses with low weak heels, as it produces pressure on the frogs without further wearing of the horn, and, when they are sufficiently grown, then the thin-heeled shoe may be used.

The Patent artificial Frog.—Mr. Coleman, convinced of the necessity of *pressure* to the frog, when he entered on his labours, invented also an apparatus for this purpose, to be applied in those cases where, by bad shoeing, or by disease, this part had become elevated from the ground; in which cases, if the heels were sufficiently lowered to bring the frog down, the tendons would be, as it is termed, strained; and to wait for the growth of the frog would only increase the mischief already brought on. The *patent frogs* were therefore intended to produce *pressure* on the *natural* frogs while in the stable, by which means the evils arising from the want of it would be relieved, and, in time, the proper shoe might be used. The ingenuity of the invention I am very willing to concede to the professor; but the utility has never been evinced, nor was it likely to become general in its use, from its complexity. Indeed, had even this difficulty been got over, still I am inclined to think the *principles* on which it was adopted wrong: the reasons for which opinion have been already, and will be yet further, detailed.

The Patent expanding Shoe.—Mr. Coleman, finding his patent frog neither expanded horses' feet, nor his own pocket, invented, or rather adopted (for the invention was a very old one), a shoe, having at the inside of each heel a clip, bent down to embrace the bar, by which it was presumed the tendency in the foot to contract would be mechanically prevented; and to promote a disposition to diverge also, the heels of this shoe are bevelled outwards. There is always a great *apparent* ingenuity in all this gentleman's plans; but I think in most of them it is *apparent* only, and does not exist in reality.

When this was first brought forward, it was, like the frog, to do wonders; and the liberty of forging these shoes was *sold*, I believe, to smiths: to complete the disinterested bargain, the liberty of wearing them ought also to have been sold to the few poor horses they were ever tried upon. But this child of adoption appears also doomed to suffer the fate of the former; although it is but fair to state, that could such a shoe be safely applied, it would be desirable, because it would certainly be more secure with a less number of nails: as an agent to prevent contraction, unless it had also a joint at the toe, its powers are undeserving of notice. This shoe is, however, altogether inapplicable, from the tenderness of the parts the clip is applied to. I have now by me screw shoes, that I used many years ago, with an embracing clip like that of Mr. Coleman's, the better to procure a firm hold of the heels; but I always found that no clip, *previously forged*, would apply without wounding the bars, from the extreme variety in the obliquity of these parts in different feet. To remedy which inconvenience, I first fitted a leaden one, which could be moulded and fashioned as I pleased; and, after it had been exactly adapted to the obliquity of the bars, I had the same formed in iron; and without a similar plan is submitted to, no shoe of this kind can be safely applied.

A more extended experience of the results, and a more strict examination of the principles of these several *adoptions*, have made me view them in a very different light to what I did when the first edition of this work appeared; and I am constrained to remark that, in my opinion, as well on the subject of shoeing, as on many others, truth is apt to be sacrificed in this seminary to false theories. To the adoption of a false theory, I conceive, may be attributed the existence of the College Shoe, now so deservedly and so generally in disrepute. It is complex in its formation, and still more so in its application, and therefore unfitted to become a general pattern. Mr. Coleman's principles of shoeing rest wholly on the importance of the frog as an agent in resisting contraction, to fulfil which intention this part must actually meet the ground whenever the foot is set down. In his practice of this art, therefore, the shape of the shoe and the horn of the foot are both sacrificed to bring this about. But when treating on the anatomy of the foot, I have endeavoured to prove, that this is not the principal use of the frog; and on the subject of contraction, I have attempted to shew, that other causes than the elevation of the frog are principally active in bringing about this evil. If, therefore, the importance of this organ, in this particular, is once overthrown, then there is an end to all the benefits promised by the College Shoe, and which, on the contrary, then becomes not only useless but hurtful; for it either forces the horse to stand on an uneven surface, or there must be an unequal weakening of the foot, by a partial paring; and it is self-evident that few can bear the latter, while the former is certainly hurtful to all. What must likewise become of the flexor tendons thus naturally put on the stretch? and what, in hard flinty roads, must become of the frog, thus battered eternally? These are not presumptive evils; they positively shewed themselves as soon as the shoe

was tried, and no efforts of the professor have been able to obviate them.

Mr. Bracy Clark's Paratrite.—The known talent of this gentleman, and his long attention to the subject of shoeing, induce me to pay great deference to his opinions; but I cannot let this respect lead me aside from pointing out, in an open manner, what I conceive to be erroneous in principle or practice, whenever I meet with it: I ask of others only the same candour I shew to them. In Mr. C.'s elegant work on the foot, he informs us that he became by degrees convinced that the diseased alteration, that so commonly takes place in the feet of horses, was not occasioned by any of the numerous causes to which it has been usually attributed, as confinement, heat, wear, improper paring; nor even is it materially influenced by what has been called bad shoeing. But, according to Mr. C., contraction, or a diseased alteration in the feet, is a necessary consequence of all shoeing, good or bad; because, by the operation of the nails, this otherwise expansive organ becomes placed within a fixed machine, whereby its natural functions are almost wholly destroyed. This reasoning is illustrated by some experiments detailed in a candid and able manner. To obviate these evils, it is the author's intention to bring forward, at a future period, an invention called the *paratrite*, 'by which the wearing point or line of abrasion of the hoof is defended, without the necessity of the application of nails, and, in general, not requiring the aid of a mechanic.'

The reasoning adduced to prove that contraction of the hoof is a necessary consequence of all shoeing, good or bad, where nails are made use of, is ingenious; neither can it be denied, perhaps, that all shoeing must, as an inevitable consequence, tend to deteriorate the foot in a small degree; but that it does not *necessarily* operate so as to render the adoption of any other plan imperiously called for, can, I conceive, be proved. Were the confinement of the foot from the effect of the nails the sole cause of contraction, it would operate on all horses shod, and in proportion to the time they had been subjected to it. Likewise, if this took place at all in the ratio of Mr. C.'s experiments, no horse at twelve years old but must be completely foundered. But, on the contrary, universal as is the evil of contraction, it is still very common to meet with horses with wide open feet at twenty years old, and who have been shod seventeen years of the time. If also all shoeing, good or bad, contracted the feet, and the other alleged causes were really inert, then we should meet with no difference between the feet of those used by farmers and other persons in the country, and those belonging to the inhabitants of large cities, who confine them wholly to the artificial habits of the stable; the reverse of which is too clear to need more insisting on. Further, it is indisputable, that although the foot is *fixed* by the nails, yet in good shoeing, where they are placed principally forward, it is but a small portion of the expansive part of the foot that is operated on by the confinement; and for the other part, the fixing it to its original standard, one might suppose *à priori* would, by preventing a recession

of its walls, operate as favourably in this respect as any other evil occasioned by it could act unfavourably. One other proof is still more conclusive, which is, that a stabled horse, *without shoes*, if managed in the usual way, and exposed to the usual causes of contraction, becomes affected, I think, nearly, if not quite as readily, as one with shoes on. Mr. C., I believe, asserts quite the contrary, and I make no doubt but that he draws his conclusions from facts; but I suspect they were only occasional ones; for I have *repeatedly* seen contraction began by confinement, heat, and a want of paring, where shoes had not been worn for some time previous.

A rational Form of general Shoe, and the Mode of adapting it to the Foot, as used in my own Practice.

If it were not that I am either too stupid to invent any thing new, or, otherwise, too candid to palm on the public a novelty which I know would prove useless or impracticable; I see no reason why, with all due deference to my own situation, all the other professors having a shoe, as Professors St. Bel, Coleman, Morecroft, and both the Clarks (even poor Taplin had his *ne plus ultra*), why Professor Blaine's shoe should not appear: but badinage apart; twenty years' extensive experience has convinced me, that no one form of foot defence can be offered with propriety as a universal pattern; nor can any one system prove generally applicable. The *principles* of shoeing ought to be those that would allow as little departure from nature as circumstances can justify. The *practice* also should be strictly consonant to the principles, and both must consist, first, in removing no parts but those, that, if the *bare* hoof was applied to *natural* ground, would remove of themselves; secondly, in bringing such parts in contact with the ground (generally speaking) as are opposed to it in an unshod state: and, above all, to endeavour to preserve the original form of the foot, by framing the shoe thereto, but never altering the foot to the defence. Nevertheless, as an artificial surface for travelling renders some departure necessary from otherwise natural principles, so it becomes the duty of the prudent veterinarian to render such deviations as little injurious as possible. On these principles I am led to recommend the following form of shoe, which I have for many years successfully used in my private practice, and which will be found as universal in its application as any apparatus can be that is to be applied to so important and so variable an organ as the foot.

The Shoe I would recommend should have the web of one width around the whole circumference, and this width should be rather more considerable than is usual, with the nails as far removed from the heels as can be with safety to the attachment; to strengthen which, and to make up for this removal from the heels, these nails should advance more around the front of the hoof than is generally done: but that the fullering may not by this means weaken the iron of this part; and also because most horses wear principally here, so every shoe should be steeled at the toe. Not only should the web be

rather wider than usual, but it should also have rather more substance or thickness than common, except in very light hacknies, or horses used on turf, sand, or other light surfaces. This shoe is not to be set so wide at the heels as is usual, by which these parts are left unprotected. So that the shoe heels stand wide enough to allow for the growth of the foot not drawing the points within the crust, it is sufficient. This will be still more certainly prevented, and the inflections more perfectly protected, if the shoe heels project rather more, that is, if they are longer than ordinary, which I think advisable, except for hunters, or horses who travel in very clayey soils, or those who overreach or interfere.

This is the general outline of the shoe I use, and it will be seen it differs from that in common use at the forges of the better order of smiths, principally in being rather thicker and wider. To an animal so strong as the horse, the addition of *weight* of one or two ounces to each shoe is very inconsiderable; but this addition to the *support* and *protection* of the foot is very material. Had the majority of horses perfectly healthy well-formed feet, and had the greater numbers of them only moderate work on level roads to perform, then a shoe altogether lighter in weight, and less in frame, might be sufficient. But it is to be considered, that there are very few feet met with but what have undergone some unfavourable alteration that at least makes them more sensible to the effects of concussion. Add to which, a great proportion of the horses in general use are worked, at least occasionally, very hard, and often on very bad roads. It is therefore, under all these circumstances, that I have considered this as the most proper shoe for general use. I have, at various times, tried all the others; but I have found the generality of horses go best in one of this kind. Very sound young feet, particularly where the work is moderate and the soil light; a tendency to tread very lightly; smallness of size, and other circumstances, may render some variation both convenient and proper; but where there is a used foot, full work, or hard roads, this shoe will be found the best that can be worn. In thin-horned feet with flexible weak heels, and in those tender from incipient contraction, it is indispensible, and the only one that can be properly applied. The recommendation with regard to the heels standing less wide than is usual, is so directly in opposition to the common method practised, and the ideas entertained on this subject, that I shall lay myself open to animadversion: but whoever will attentively examine a shoe *well set off* at the heels, as it is termed, will find only one-third of the surface, sometimes hardly that, protecting the heels; the remainder projects beyond, and serves no purposes but those of a shelf to lodge the dirt on; a convenient clip for another horse to step on; or a more ready hold for the shoe to be forced off by in clayey grounds. Nor are the heels sufficiently long for the protection of the foot in the generality of shoes, and which defect, more than a want of width, causes the tendency for them to press on the crust of the heels. If a shoe is suffered to remain on an improper length of

time, no form can guard against the evil; but if it is removed sufficiently often (and I am directing a shoe for wear and not for contingencies), no chance of the heels ever getting within the crust can occur. If the decreased width of the standing of the heels, and the increased width of the web, should make the inner angle of the shoe heel in danger of interfering with the frog, the corner may be taken off.

Nothing has been hitherto said on the popular subjects of seating and bevelling. I have used this shoe entirely plain, and I have used it seated, both outwards and inwards. Some conveniencies, and some inconveniencies, attend each of these modes. A shoe perfectly plain on both surfaces, or nearly so (for all are something thinned towards the inner edge), is most easily formed; and, in giving directions to a country smith, this would puzzle him the least: but this shoe could be only applied with propriety to a foot whose sole was sufficiently concave to admit of its descent, without interfering with the shoe, and without pressing on occasional lodgements of dirt; which are more likely to remain upon this flat upper surface than on one seated inwards. In soles at all tending to become flat, a seating over two-thirds of the inner circumference of the shoe is absolutely necessary; and as its make gives it a tendency to throw off the dirt and stones received, so this is the form of shoe to be generally recommended. Add to which, by this seating, the shoe is rendered lighter. An outward seating, according to the plan of M. St. Bel and some later practitioners, presents at first sight an appearance of following nature, and of giving a surer support by a more pointed pressure downwards, with an equally stable support upwards; and if we could make shoes at once ductile and durable, this would for all well-formed feet be an excellent mode: but, unfortunately, this outer rim soon wears down, and the expectations raised relative to its utility are not fulfilled; and, what is worse, the shoe must either be rendered improperly thick, or this loss of lower rim will weaken it.

Whenever frosty weather, hunter's shoeing, or heavy draught work, makes *calkins* necessary, the utmost caution is required to avoid elevating the outer heel *only*, as is sometimes done. If two calkins are not used, at least thicken the inside heel to an equal height with the outer. It now only remains that I mention one other caution, which is to be observed equally in every shoe; this is, that both marginal surfaces should be *perfectly level;* nor should any shoe be put on that has not been critically tried on a *plane iron*, which should be purposely kept in every shop. Were this examination made on every shoe, we should not have the barbarous and destructive custom of a thick clubbed heel exactly applied to, and pressing on, the weakest part of the foot, as is too generally practised even in forges where we should expect to find a better mode of operating.

Having thus described the *shoe*, I shall now proceed to point out the proper method of preparing the *foot* for the application of this

or any other shoe in common use. The operation is, of course, commenced by pulling off one old shoe; for it is better never to take more off at once, if it can be avoided, otherwise the horse is apt to break away the edges of the horn while standing so long bare on the pavement. In removing the old shoes, great care is necessary that the clenches are first thoroughly raised, so that the crust may not be torn, or portions of the nails left within the horn. This being done, the rough edges of the crust should be rasped, which prevents its breaking away when set down, and detects any stubs of old nails left behind, as well as removes loose portions that would hold gravel, and turn the edge of the drawing knife. The next process is to thoroughly pare the sole throughout, until it can be what is called *thumbed*, or felt to spring by a forcible pressure of the thumb. In this paring, the natural form of the arch of the sole should be as closely imitated as possible, and particular care taken that no part of it is left to protrude beyond the line of the crust; on the contrary, its concavity ought to commence immediately from the line of separation between the crust and sole; but not from the edge of the crust, as I have seen done. The whole thickness of the crust, be it more or less, ought to be left perfectly flat for the bearing of the shoe. Habit, and a correct eye, can detect any inequalities in this surface, without a momentary application of the heated shoe to try the bearing parts, as is usually done; and which, if the shoe is also previously tried with a plane iron, may very well be avoided; although the outcry raised against this practice is, in a great measure, unnecessary; for, unless the shoe is very hot, and held on too long, no harm probably results from its application. In common rough shoeing, also, this error is infinitely less than the application of the unequal pressure which it is intended to prevent would prove. The portion of sole between the bars and quarters should be always pared out; and, if properly done, is the surest preventive against corns. The heels should be an object of great care, and ought to be carefully reduced to the general level: in no instance must they be left high; but, when any tendency to contraction exists, they should be kept still lower than common, so as not to put the flexors on the stretch. It is also of consequence that the inner heel should never be reduced beyond the outer: if by bad wear, or by bad management, it is observed to have become the lowest (as is too often the case), encourage its growth by taking none away at the paring, and also by laying the shoe but lightly on it. A want of attention to this circumstance of inequality in the heels, lays the foundation for corns and splents. I have yet made no mention of the frog, which is, in general, almost the very first object of attack as soon as the knife or butteris is taken in hand; but I would, on the contrary, recommend that the sole, crust, and heels, are first attended to, and then a mistake in paring the frog is less likely to arise: for it may be regarded as a general rule, that when the frog is on a level with the returns of the heels, and with the crust, it is as large as it ever ought to be; the heels of the shoe will raise it sufficiently for protection against

too much wear, but will not elevate it beyond a proper share of pressure. Smiths, likewise, are sometimes apt to leave a large uneven portion at the point, which presses painfully against the centre of the foot; this should be avoided by gradually tapering it away like the natural growth; but all unnecessary cutting and trimming of the frog should be studiously avoided; and when it is below the general surface, then nothing should be removed but the mere ragged portions which harbour dirt and moisture. Almost every smith is impressed with an idea of *opening the heels*, which, with them, is nothing more than cutting away the edges of the inflections of the hoof, where they turn to form the horny heels, and are continued under the names of bars or binders. In contracted feet these inflections sometimes press inwards, and actually squeeze the frog; from observing which, smiths cut away the extreme edges of the pressing part; and as, in such cases, this practice is observed to give some relief, so it has become a principle in their minds that it is a salutary process to every foot; and as it leaves a momentary appearance of widened heel, it is not possible to convince them but that a *real* enlargement of the posterior part of the foot is the consequence. It is hardly necessary to remark that this practice is founded in the grossest ignorance, and, instead of eventually opening the heels, it tends permanently to contract them, by weakening the bars, and the practice should therefore, in every instance, be forbidden, except as before mentioned, in cases where the heels bind in so much as actually to press the frog between the horny edges, when it is justifiable to relieve the immediate pressure by cutting out the binding portions of the inflections; but it must not be forgotten in this case, that the remedy is only palliative, and more permanent means should be adopted for the future prevention of the evil. (See *Contraction;* see also *Anatomy of the Foot.*)

We will suppose the under surface of the foot pared, and a shoe applied, having a perfectly flat surface of its own, and being placed upon as true a surface of the horn. In such case many nails are not necessary, nor need they be large: it is also of consequence that they are not driven too high up into the horn, as is too often done; neither need they, in common cases, be hammered so hard, or the shoe be so much tightened, as I have seen done. It only therefore remains to remark, that, whenever there is the smallest tendency to contraction, I would strongly recommend that, after the shoe is applied, the hoof may be thinned a little, exactly in front, from the hair to the toe, by means of the rasp. This part may be regarded as the centre of contraction, and its being moderately thinned in one narrow surface, of an inch in breadth, will not in the least weaken the foot, but will operate very favourably in both preventing and reducing contraction. Its action, in this respect, may be exemplified by the common practice of thinning the back of the toe nail, when it has indented its edges into the flesh, which this thinning instantly relieves, as certainly, as the occasional repetition of it afterwards will prevent a recurrence of the evil.

Of Surgical Operations,

And the various Restraints it is sometimes necessary to place the Horse under for their due Performance.

WHEN it is necessary to perform any painful or unpleasant operation on so powerful an animal as the horse, it is of consequence to secure both him and ourselves from the effects of his resistance, by subjecting him to a *restraint* equal to the occasion. Horses are very unequal in their temper, and bear pain very differently; but it is always prudent to prepare for the worst, and no important operation should be attempted without casting; but which some idle and foolhardy smiths and farriers avoid, and do every thing by the side-line and twitch, too often calling in the aid of the broomstick. To give directions on such minute points to the experienced veterinarian will seem unnecessary; but as this work is intended as a guide to the inexperienced and junior practitioner, so I shall not *always* prove uninteresting or uninstructive when I descend to these minor matters. Humanity should be the fundamental principle of every operation, and we ought always to subject this noble animal to pain with reluctance; but when circumstances absolutely call for it, we should carefully avoid an unnecessary infliction of suffering. The resistance of the horse is terrible, and it is but common prudence in the veterinarian to guard himself against the effects of it. The *lesser restraints* are various: among them may be first noticed the *twitch* and *barnacles*.

The *twitch* is a very necessary instrument in a stable, though very often unnecessarily used, which has the ill effect of rendering some horses violent and vicious to resist its frequent application. In many instances blindfolding will do more than the twitch; and some may be quieted, when the pain is not excessive, by holding the ear in one hand, and rubbing the point of it with the other. A firm but soothing manner will often engage the attention and prevent violence; but it is seldom that either threats or punishment render an unruly horse better. Inexperienced persons guard themselves against the hind feet only, but they should be aware that some horses strike as truly and as terribly with their fore feet. It is prudent therefore, in all operations, to blindfold the animal, and the more so, as by this he becomes particularly intimidated, nor will he often strike without an aim. *Barnacles* are a sort of clams used by smiths, into which they introduce the nose in the manner of a twitch. They are only admissible when a person is so situated as to be wholly without assistance.

When one of the fore feet or legs requires a minute examination, it is prudent to have the opposite one held up; it is, in some cases, tied up by a noose: and when one of the hinder legs is the object of attention, the fore foot of the same side should be held up, as, by this means, the animal is commonly prevented from striking, by the failure

of his lateral support. If this precaution is not taken, still observe to keep one hand on the hock, while the other is employed in what is necessary, by which means, if the foot becomes elevated to kick, sufficient warning is given, and the very action of the horse throws the operator away from the stroke. Without the use of these precautions the practitioner will not only expose himself to much risk, but a neglect of them is sure to subject him to a suspicion from those around that he does not know his business.

The *Trevis*.—This is the very utmost limit of restraint, and is very seldom used but by smiths to shoe very violent powerful horses. Whenever recourse is had to it, the greatest caution is necessary to bed and bolster all the parts that are likely to come in contact with the body. On the Continent I have seen horses very dexterously shod in this machine, and apparently put in under no other necessity than either to avoid labour, or, ridiculous as it may seem, to prevent the clothes of the smith from being injured or dirtied by the common method. Many horses have been destroyed by the trevis, or, at least, their aversion to the restraint has been such, that they have died under their own resistance; it should therefore never be used until every other means have been tried in vain.

The *side-line* may be conveniently used in minor operations, particularly on such horses as are disposed to strike behind. It consists in placing a hobble strap on one hind leg, and then passing the end of the rope attached to it over the withers, bringing it back again under the neck, and over the other portion, so as to leave a slipping collar, as it were, round the neck, by which the hinder leg should be drawn forward as far as it can without elevating it from the ground. By this displacement of one leg the horse is effectually secured from kicking; it is therefore a very useful means of restraint in slight cases, but, as before noticed, I would not recommend the veterinarian ever to trust himself or patient to the side-line alone for any important operation.

Casting.—This, to the practical veterinarian, is an operation of importance, from its frequent occurrence in the first place; and, in the second, because, unless judiciously managed, serious accidents may arise from it. Mr. Bracy Clark has simplified the operation, by inventing some patent hobbles, having running chains instead of ropes, and which, by a shifting D, makes the loosening of any one hobble, for the purpose of getting at a particular leg, unnecessary. These are now still further improved by Mr. Budd, so as to render a release from all the hobbles at once practicable. Hobble leathers, and ropes, should be kept supple and pliant with oil, and ought to be always examined previous to using; nor should the D or ring of the strap be of any other metal than iron. Brass, however thick, is brittle, and not to be depended on. To this D or ring of one hobble, in the common method, a very flexible strong rope is well fastened by a noose, and, according to the side the horse is to be thrown on, this hobble is to be fixed on the fore foot of the contrary side, and from that to the D of the hind foot of that side, then to the other, and,

lastly, through the D of that on the other fore foot. After this, much of the ease and safety of the *throw* depends on bringing the legs as near together as possible. This should be done by gradually moving them nearer to each other, without alarming the horse, which will very much facilitate the business, and is really of more moment than is generally imagined. A space sufficiently large should be chosen for the purpose of casting, as some horses struggle much, and throw themselves with great violence a considerable way to one side or the other; and this particularly if the feet have not been brought near together previous to attempting the *cast*. The place should be also very well littered down, first with dung, and next with straw. The legs having been well put together, the assistants must act in concert; one particularly should be placed at the head, which must be carefully held throughout by means of a strong snaffle bridle; another should be at the hind part to direct the fall, and to lay the horse on which side is requisite. Pursuing these directions, the animal may be at once rather *let* down than *thrown*, by a dexterous and quick drawing of the rope, the whole assistants acting in concert. The moment the horse is down, the rope must be fastened; and particularly the person at the head must keep that secure, for all the efforts to disengage himself are first began by elevating the head and fore parts; but it is necessary to keep some soft padding under it, or he will rub the eyelids bare by his struggles. Great care is also to be taken that the horse be allowed to breathe freely when down; and no more time should be wasted in the operation than is absolutely necessary, as many horses continue to struggle throughout, and waste themselves much.

CASTRATION.

A good deal of difference of opinion exists as to the proper *time* of castrating colts. Bulls are often *cut* at eighteen months or two years old; but it is observed that they grow larger, and fatten sooner, when it is done at ten or twelve days after birth. They prove to have less ferocity also, and more activity. In colts it is sometimes performed at three months, at others it is deferred till twelve months: this latter period is, however, objected to by some breeders, because they think the animal has not sufficiently recovered the check experienced from weaning before this new one arrives. In the more common sort of horses used for agricultural purposes, it is probably indifferent at what time the operation is performed, and three months, if the weather is not hot, is as good as any. But when the breed is good, and any considerable expectations are formed on the colt, it is always prudent to wait till twelve months. At this period he should be accurately examined, and, if his foreparts appear correspondent to his hinder, proceed to castrate; but if he is not sufficiently grown *up* before, or his neck appears too long and thin, and his shoulders spare,

he will assuredly improve by being allowed to remain *whole* for six or eight months longer. Some of the Yorkshire breeders do not cut till two years, and think their horses stronger and handsomer for it. The fear in this case is, that the stone horse form will be too predominant, and a heavy crest and weighty forehand be the consequence; perhaps, also, the temper may suffer. Young colts require little preparation; but those of more mature growth should be bled and lowered in their system; and a time should be chosen that is neither too hot nor too cold.

Method of Castrating.—Having cast the horse on his left side, secure the off or upper hind leg with the flat web part of a halter; a flat piece of hempen tackle, with a running noose, should always be kept on purpose. This must completely secure the leg before the hobble is removed from it; after which the leg is to be drawn forward, by means of a web collar around the neck, in the manner of the side-line, and then carefully fastened. And here may be seen the advantage of hobbles with a false or screw D, as described in casting, by which all danger from loosening may be avoided. Having every thing in readiness, grasp the scrotum firmly with the left hand, and with the right make a section towards the pending part of the bag by a neat flexion of the scalpel, through the integuments, and of sufficient length for the testicle to protrude itself through. Grasping the testicle with one hand, with the other push the scrotum back, so as to expose the spermatic cord, on which fasten the clams sufficiently tight to prevent its slipping, and then dissect or cut away the testicle, leaving a small portion of the cord without the clams for searing. To this end of the cord, while held by the clams, apply the firing iron, sufficiently hot to produce an eschar that will stop the bleeding, but not, as is frequently done, so hot as to burn it to a cinder. Having finished this, proceed to make another section, and to remove the other in the same way.

I used to dress the parts after the operation with mild spirits, or the common tinctures, which may be done or not at pleasure; but of late years I have only applied some dry lint, placed a little within the edges of the divided scrotum, and this merely to check the bleeding from its edges, which, in older horses, is often considerable. In colts, no dressing at all is required, nor any kind of bandage; neither is any bandage desirable in more adult horses, as it is apt to get stiff, and become difficult to remove; it also alarms the horse when attempted to be taken off, yet tender and fearful from the recollection of the pain.

In this operation the principal cautions requisite are, first, the necessary force required to hold the clams without wounding or materially bruising the cord: if it is held very tightly, more inflammation often follows than is pleasant; and even the portion of cord held sometimes sloughs off. If it is not held sufficiently tight, still greater evils may ensue; which are, the escape of the cord into the cavity of the belly, and an alarming hæmorrhage. Among Veterinary Instruments, may be seen an improvement in clams. The next caution is in the searing, but which is of less importance than the other;

that is, it would be better to sear too much than too little, because, when it is not done sufficiently, in a few hours the force of the spermatic artery will overcome the eschar, and hæmorrhage will ensue. On the contrary, if it is cauterised too strongly, inflammation is sometimes apt to make its way up the cord, and to delay the healing. In many cases, after castration, not a single unpleasant symptom arises, but the horse will eat, drink, and even exercise himself without difficulty or apparent pain; and such is generally the case with colts of whatever age; for whom therefore only common precautions are requisite. But, in adult horses, considerable swelling and inflammation often follows, and to such a degree as to make it prudent to bleed and give a mild purge; the parts also may be fomented with warm Goulard water; and if the inflammation is very considerable, insert two rowels into the thighs. Mr. White says all precautions of this kind are unnecessary, and that nothing more is requisite than to scarify the swellings by numerous punctures with a lancet, by which means the deposited fluid will flow gradually away. To assert that no precaution is ever necessary, is, I think, wrong, and may mislead; for although this mode of removing the tumefaction may be very proper where the swelling is unaccompanied with much heat and irritation; yet I have seen cases where much more was requisite, particularly in old stallions; for, in some instances, the pulse is much quickened, and the swelling that appears is phlegmonous, and will yield no fluid if punctured. Under such circumstances the plan I have laid down is not only prudent but necessary. When much swelling follows the operation, common farriers recommend trotting the horse about, but this should never be done; on the contrary, in all cases of adult castration, the horse should be put into a loose box, and not exercised till the third or fourth day, unless the legs swell much, and the horse appears otherwise but a little affected, when a little gentle walking may be allowed. The food should be moderate, as hay and mashes in winter, and in summer green food, if it can be got.

Now and then, but not often, sinuses, and ill-conditioned sores, will form in the scrotum. In such cases the cavities must be syringed with the mild liquid blister, which will readily promote a healing process after the first application. It remains to observe, that the plan in use by some gelders of castrating at twice, by means of caustic, with an appearance of little form or trouble, should neither be attempted nor sanctioned by the regular veterinarian, who should, on the contrary, pursue one steady course, founded on proper principles; in which case he will not be answerable for adverse circumstances, and will also be commonly able to combat them.

DOCKING.

This operation consists in a removal of a portion of the tail, now conveniently practised by what is called a docking machine, which

takes it off by one stroke at the part determined on, which is previously clipped bare from hair. In colts, the *searing* should be very slight; and, in the adult horse, it should never be harsh; for even, if altogether omitted, the hæmorrhage would seldom be serious. In very full fat horses I have sometimes merely applied a little powdered alum to the end of the tail, and though a good deal of blood has been lost, the quantity has never been alarming. The most serious consideration in docking is, that, slight as the operation appears, mortification will occur in some instances, and locked jaw in others. In the latter case I would recommend, in addition to the other treatment of tetanus, the removal of another portion of tail, and to sear it also. But, in mortification, warm terebinthinated dressings only must be applied, in addition to the treatment of mortification, which see.

NICKING.

Various modes are in use for securing a horse for this operation. Some do it in the trevis, others place him against a standing, with his tail hanging over, such as a leaping bar, a wide stall, &c. But the most general mode practised is by casting. It was formerly usual to make three deep incisions through the depressor muscles and tendons of the tail, which produced what is called a *nag*, or *nicked* tail. A much better custom is now prevalent, which is that of preferring the *blood*, or more natural tail, which hangs of itself, without nicking, in an elegant curve, sufficiently removed from the body to give the horse length in appearance, and to counterbalance the extension of the head and neck. Yet as, in some horses, the extensors do not sufficiently overbalance the depressors, so it still becomes necessary, though much less frequent than formerly, to divide them by one or more transverse sections. But, as we have before observed, it is now frequent to make only one nick, at about three inches from the base of the tail, but never nearer. The section should be began at the roots of the hair on one side, and carried across to the roots of the hair on the other side, through the whole muscular substance. If a complete blood tail is intended, or if the subject is a mare, this one section is all that may be required; in which case the tendinous ends to be cut off will not become so prominent as though there were other sections. Enough will, however, in general appear to enable a forceps or tenaculum to get at them, when, by drawing the divided portions a little more out, a pair of short sharp scissars will be able to pass under and cut them off. But, when a second and third nick are to be made, proceed, after the first, to make the second in the same manner, at two inches distance in a very small horse, and at nearly three in a large horse, and so on with the third, if necessary. Under the circumstances of *repeated* sections, the ends of the tendons bulge and become very prominent, and may be easily got at by the forceps or

hook, and then cut off. The intention of this removal of the tendinous ends is to separate more widely from each other the extremities of the muscles, which, if too nearly approximated, would reunite, and frustrate the operation. When all the sections are made, examine them carefully that they are all of equal depth, and that the whole of the depressor muscles have been cut through. Should there be any considerable difference in the sections of one side, and such difference be allowed to remain, to those of the other, the horse would carry his tail to one side. After the regulation of the nicks, introduce into each a pledget of tow with lint on its upper surface, smeared with digestive ointment, sufficient to fill up the cavity; upon this place a bandage of linen of three inches wide and two feet long over each also, which tie on the upper part sufficiently tight to stop the bleeding; but not so much so as to strangulate the tail, which must be most particularly attended to: if, therefore, it is forced to be much tightened to stop the bleeding, do not forget to loosen it again in two or three hours. It has been said that digestives and all dressings are unnecessary. Did, however, no other good arise from them, they permit the bandages to be more easily removed; but, as we know this operation frequently produces locked jaw, and as there is reason to believe that, when once a healthy inflammation and matter appears, there is less danger of this fatal termination; so it is prudent to stimulate the wound to an early production of pus.

Various pullies are used for nicked tails; but the best are small brass ones, that work doubly, and are to be obtained at the veterinary instrument makers. With the use of these there is less danger of the horse carrying his tail awry; and when these are not at hand, still some apparatus should be employed that will allow the horse to carry the weight or extending body, always in a straight line from his croup, let his motions in the stall be what they may. It is common to use too heavy weights for extending the tail, which, by putting it unnecessarily on the stretch, frequently produce inflammation. The weight should, for the first two or three days, be very moderate, and afterwards gradually increased to what is sufficient to keep it completely extended, but never to draw it much upwards. If the operation has been performed in the morning, by all means loosen the bandages at night: if it has been done in the afternoon, they may remain of a moderate tightness till the next morning, but never longer. When this precaution has been neglected, the tail has become strangulated, and mortification has ensued. No other dressing need be applied, nor any other application made, until the former one appears ready to detach itself by the suppuration; but as soon as this happens, the first dressing may be removed, and another applied, according to the fancy of the operator. I sometimes introduce a small piece of lint only into each nick, and this I have always found sufficient. Others dress *secundem artem*, with digestives, &c., but without any superior advantage. Indeed, Mr. White informs us, that he put the matter to the test of experiment, by dressing and cleansing them with various ointments; and, in others, he left wholly without covering, dressing,

or cleansing, and that these were healed sooner than the former. Much difference of opinion likewise exists as to the propriety of exercise during the use of the pulley, and also as to how long the pulley should be used; but these matters are easily solved by a knowledge of the general principles of the animal economy, which alone ought to guide the veterinarian. The pulley is only an extension of the tail, to keep the ends of the muscles from uniting again; but the simple extension does nothing of itself, as is foolishly supposed, towards the making the horse carry it in future. As soon, therefore, as the wounds are closed, or nearly so, then all benefit from the pulley is finished; but till then, of course, the muscular ends may unite, and frustrate the operation. Sometimes incrustation of the wounds will take place in ten days or a fortnight, and sometimes it will take a longer time. With regard also to the propriety of exercising the horse, there ought to be but one opinion. As the hair is, or ought to be, platted and carefully secured, so no inconvenience can arise from letting him from the pullies, and exercising him gently to remove swelling. The hair being put on the stretch by the force used, so a great part of it usually comes off, and this will happen in spite of every precaution; but the longer it is kept in one immediate position, so much the more certain it is for much to fall off. At the end of five or six days therefore it may be untied or unplatted, combed out, and then tied afresh, being first greased at its roots; and the same may be repeated every three or four days afterwards, which is the best means I have found of preventing it from falling totally off.

Nicking, unfortunately, is found now and then to end in mortification, and still more frequently in locked jaw. When the former happens, the horse shews evident uneasiness the second or third day, the tail swells, is very tender towards the rump, and the heat is excessive. If the dressings are removed, the wounds look highly inflamed and tumefied; and unless this inflammatory state is arrested by the most active means, the wounds will become gangrenous, the stump cold, and mortification will proceed towards the body, and either destroy the horse; or it is sometimes arrested at the base of the tail, and at length suppurates and drops off. In such cases the treatment must be exactly what is detailed under the head *Mortification*. The best means of preventing this evil is to keep the tail constantly wet with cold water, during the first week of the operation; as likewise to observe what has been said on the subject of loosening the ligatures, and not forcing the tail too early and too much back.

When locked jaw follows nicking, it usually comes on the fourth or fifth day; I have, however, known it sooner, and later also. In these cases the appearance of the wounds is seldom different from a natural state; sometimes, however, I have found a flabbiness about them, and a want of suppuration. Stimulant dressings, applied hot, should be immediately tried in such a case, and the treatment detailed under the head *Tetanus* must be pursued with activity, though, unfortunately, it seldom succeeds. The cause of this termination may be either excessive heat or cold in the temperature of the atmosphere at

the time of performing it; but, beside these, there is also a hidden tendency in some constitutions dependent on causes unknown to us.

Among the list of veterinary instruments will be found a most ingenious machine for the management of the tail after nicking, in which the whole apparatus is attached to the horse.

CROPPING.

Custom has nearly abolished this worse than useless practice. Circumstances may, however, occur to render it necessary, such as one ear becoming blemished; therefore, at the makers of surgical instruments, we always find a sort of curved clams, called cropping-irons; into these one of the ears is introduced, and the upper part is cut off at one stroke with a knife of sufficient length: the portion cut off will serve as a guide for forming the other crop. A young practitioner is apt to be alarmed at the retraction of the skin from the cartilages, but the exposed edges disappear in a few days. Horses are apt to continue for a long time very shy about the head by cropping; to lessen which a bridle and halter also should be used, without a forepart or fronting, till the ears are well. The bridle should also be made to unbuckle at one side from the bit, so that the headstall may be dropped on without the hand being raised to pass it over the ears. This will materially operate in dissipating the customary shyness that otherwise so long remains, and which is never wholly lost if force and cruelty are afterwards used.

BLEEDING

Is the removal of blood from any of the vessels of the body; and is sometimes performed in health for the prevention of disease; but more often it is performed in disease as a means of cure. When blood is taken from an artery, it is usual to divide the vessel throughout, for the muscular fabric contracts the sides, and hæmorrhage is spontaneously stopped. When bleeding is performed from veins, a longitudinal opening is made, by means of an instrument called a fleam, which is commonly struck with a stick, or sometimes pushed forward by means of a spring; or the opening is made by a lancet, which should always be used in bleedings from the veins of the legs and thighs, as the only means to avoid wounding the fascia. Blood may also be drawn from the toe by means of the drawing knife; and, from the skin, by the application of leeches. Many instruments have been invented for the purpose of bleeding by a spring, but they have all hitherto failed, and I would recommend the veterinarian always to abstain from their use. The large horse lancet, shaped like the hu-

man, should be as much used as possible; and when the practitioner is become expert in its use, he will find it the most convenient instrument for bleeding. Some practice, however, is necessary before a person can bleed without two punctures, one through the skin, the other through the coats of the vein; and, without some practice, the vein is also apt to be altogether missed. The bloodstick and common fleam may, however, if preferred, be very safely used, provided care is taken not to strike the fleam too violently, and push the point through the opposite coat of the vein. It is also prudent, when the fleam is used, to blindfold the eye on the side the blood is drawn from, or otherwise, at the stroke, the horse will start and frustrate the operator. Practitioners are apt to be too indifferent as to the state of their instruments. Lancets and fleams should be always sharp and highly polished, and, after bleeding, care should be taken to dry them and examine the points.

Any of the superficial veins of the body may be opened; but blood is more frequently drawn from the jugular or neck vein; the superficial vein of the fore and those of the hinder extremities, called the plate and thigh veins. The temporal artery may also be opened by a lancet, in the common way, which is preferable to *dividing* it, as is done in the human. In bleeding from the neck, the most convenient spot for the puncture is about two inches below the division or bifurcation of the vein. (See *Anatomy of the Head.)* A ligature is seldom necessary: if the subject is in health, a little exercise will raise the vein; and if not, a pressure of the fingers of one hand is commonly sufficient, while the lancet may be introduced with the other; or, in case the fleam is used, the hand that holds it may also press the vein while the other occupies the bloodstick. After a sufficient quantity of blood is drawn, introduce a sharp pin, and surround it with a little hemp, tow, or worsted; but, in doing this, do not draw the skin from the vein, which is apt to allow the blood to escape between the skin and vein, and occasion inflammation. In bleeding from the superficial veins of the fore or hind extremities, never use a fleam, but always the lancet, by which wounds of the fascia may be avoided. The temporal artery may be opened in cases of staggers: but when recommended in ophthalmia, it should be remembered that it does not act immediately on the eye, which has been already explained. (See *Anatomy of the Head.)* This vessel can be readily detected at three or four inches below the root of the ear in a line towards the nostrils, and may be punctured by a common lancet in the same manner as a vein, and afterwards secured in the same way. But when opened for furious delirium, there is no necessity for securing it at all: the collapse of the artery will take place soon enough, and in general too soon, so as to require the aid of bleeding also from the jugular. In drawing blood from the foot, nothing more is necessary than to pare the horny marginal line of the toe till the blood flows, which, from the great vascularity of the part, it will continue to do for a long time. Or a small opening may be made with the drawing knife immediately behind the line of separation between the sole and

crust; by which means the plexus of vessels that surrounds the foot, called by the farriers the *vein*, will be wounded, and yield a large quantity of blood. Leeches are not usually applied to horses; in some cases, however, they may be used, as in ophthalmia: but perhaps emptying the vessels by a lancet applied to the surface of the cornea is a preferable mode. Bleeding in the mouth is seldom resorted to by the regular veterinarian; I know no good to be derived from it.

In drawing blood it should be an invariable rule never to let it fall on the ground: it should not only be received into a vessel, but into one by which the quantity can be accurately judged: for which purpose, in every well regulated stable there should be a tin measure that will hold six, seven, or eight quarts, graduated into pints and quarts, into which the blood should always be drawn. It likewise requires to be held steadily, and afterwards set down carefully in a place of rest, by which means it will preserve its real state. The various cases in which bleeding should be performed, it would be unnecessary to particularize here; it is sufficient to observe, that the quantity taken away is, in general, too small. In a large horse, under any important inflammatory affection, particularly if early in the complaint, the first bleeding should not be less than from four to five or six quarts. In staggers and inflamed lungs, a still larger quantity may be drawn at the first operation. In all other cases not specified, or where nothing particular prevents, from two to three or four quarts may be taken, according to the age, size, and strength of the animal, &c.

In all important inflammations it is of consequence to draw the blood from a large orifice, and as quickly as may be. The increased action of the vascular system appears to be more readily checked by a sudden evacuation of blood; probably from a sympathetic effect, by which the vessels recover their tone by the hasty depletion.

On the subject of bleeding, it is necessary to remark that the fluid itself drawn presents indications that should be attended to. When blood is taken from a healthy subject, and suffered to settle without disturbance, it soon separates into two portions. One is fluid and yellow, called the serum; the other forms itself into a red jelly-like cake, and swims in the serum: but under inflammatory diseases, both these parts undergo alteration, and exhibit different appearances to what they do in health. In violent inflammations the quantity of serum is small, but not materially altered in colour, though sometimes it is rather milky; but the cruor or crassamentum, which is the jelly-like cake in the centre, instead of being easily broken, becomes tough; and, instead of being of a bright scarlet, its surface is yellow; sometimes it is perfectly yellow for two inches of its depth. Such blood is called *sizy*, and exhibits great marks of inflammation, and is a very important monitor to us to repeat the bleeding as long as the same appearances last, provided the horse's strength will bear it. When, on the contrary, blood is drawn which

exhibits much serum, with the coagulum, red, but thin, and without tenacity, we are warranted in considering it as a case marked with debility, in which a repetition of the bleeding would be injurious.

PHYSICKING.

THERE is not a perfect analogy between the action of purgatives in the horse and in the human. A neglect of this consideration has led persons into improper conclusions, and very improper administrations also. Substances that are brisk cathartics to the human intestines, have little effect on the horse. Jalap is a remarkable instance of this; hence the folly of adding it to the purges in veterinary practice, as is often done. It is not only in the substances employed that the difference between the action of purging in the horse and man consists, but in the effects also. In the horse, from the increased track of intestines, and their greater dimensions, but more particularly from their not being assisted by an erect position, they are more difficult to be acted upon by purges, although they are infinitely more irritable than the human intestines; and hence one dose of physic weakens a horse more than three will a man.

Purges may act in two ways; either by increasing the peristaltic motion of the bowels, and thus producing a more quick discharge of their contents; or they may act by increasing, with the other fluids of the bowels, the secretion of the bile, which is the natural purge of these organs. Purges not only quicken the expulsion of the intestinal contents, but they alter the consistence of the matter expelled. This appears to be effected partly by the lymphatics being prevented from absorbing the fluid parts of the aliment; and partly, also, by the secretory surface of the intestines themselves being stimulated to throw out a greater quantity of fluid than usual; and it is on this property that the beneficial effects of purges principally depend.

This being the simple operation of purging, it is evident that what has been termed *elective purgation*, that is, the giving particular substances to purge particular humours, is wholly vague. Purging is used to reduce swelled legs; but no purge acts on the legs *immediately;* for it cannot remove the fluids from any other parts but the stomach and bowels: but *mediately* it may remove them; for the loss of the fluids of the stomach and bowels puts the absorbents to work to remove the fluids from other parts to make up the deficiency, and thus the legs become lessened. From this it is evident how erroneous it is to suppose that any humours are passed off in purging; or that hard riding is necessary previous to a purge to stir up these humours. From this also it may be learned, that it is most absurd to suppose that no purge can do good unless it is strong

enough to considerably affect the horse's health. If it completely empties the bowels for a few hours, it is all that ought to be required of it. The strongest purgative will only act thirty-six or forty-eight hours, and perhaps destroy the horse; but as two purgatves of milder quality may be given at different times to produce as much good effect, and with perfect safety, who would act so erroneously as to give too strong a one? Purges are given for various reasons. In inflammatory affections they are supposed to promote the same end as bleeding, that is, to empty the vessels by lessening the quantity of blood: but there is this difference, that, in purging, the watery parts of the blood only are removed, and the stronger parts are left behind. Hence purging does not act so readily in reducing active inflammation, as bleeding; neither is it so salutary as bleeding to the horse, in important internal inflammations, because it is not, as in the human, a quick mode of depletion; on the contrary, as it irritates some hours before it acts, so it is, during that time, in many cases, doing more harm than good. But, in strong external inflammations, the same objections to the use of purges do not exist. Horses are purged in health to promote their condition, and in this these remedies bear no analogy to the human constitution. When veterinary medicine was first studied regularly in this country, by reasoning from analogy, it was usual to condemn the systematic purging of horses, to get them into condition, as absurd; but experience has shewn, that, although often given unnecessarily, it is yet actually necessary to promote certain states into which a horse must be brought before he can undergo particular exertions, such as hunting, racing, or matches against time. In such cases, purges act by removing the watery parts from the blood, which stimulates the absorbents to take up all the interstitial fluid from between the muscles, and that also which is distributed over various parts of the body; thus the weight is lessened without the strength being decreased. The fat is also removed by the same process, and thus the muscular fibres can be more closely applied, and can act by this approximation to greater advantage. In this way, the lungs can also act more advantageously, being freed from any incumbering substances or fluids; hence the strength and wind are both increased by purges. Physic is given to horses to remove worms, by promoting the expulsion of the mucus in which these animals imbed themselves; but, to effect this, the dose should be tolerably strong.

The substances used to purge horses, under the technical name of *physic*, are aloes, calomel, and neutral salts; but, of these, aloes are infinitely the most frequently employed (see *Cathartics, Materia Medica*). I formerly used only the socotrine aloes in practice, and, when they can be got in quantities unadulterated, they perhaps are the best. But I believe it is so much the custom to weaken them by admixture, that it is hardly possible to get them perfectly pure, and hence their operation is more uncertain than that of the Barbadoes aloes, now in more general use; and which, if only the common precautions are used, may be given with perfect safety. Cape

aloes are less strong, and still more uncertain than the socotrine: they are also less pure. In the following formulæ, Barbadoes aloes are therefore mentioned for the above reasons; but when the socotrine are used, one dram more may be added. And, when Cape aloes are employed, then one dram and a half must be added to the quantities specified, which are of three several strengths, to suit all cases:—

No. 1.—Barbadoes aloes . . . . . five drams,
Oil of caraways . . . . . ten drops,
Castile soap . . . . . half an ounce.

Make into a ball with syrup, honey, or treacle.

No. 2.—Barbadoes aloes . . . . . seven drams and half.

Add and mix, as the former.

No. 3.—Barbadoes aloes . . . . . nine drams.

Add and mix, as the former.

When it is thought proper to give mercurial physic for worms, hidebound, or other skin complaints, two drams of calomel may be given at night in a mash, mixed previously with a table spoonful of flour. This, by laying all night in the horse, may, perhaps, assist its efficacy particularly in case of worms; and the aloetic ball may be given the next morning; keeping in mind that it should be something less strong for the calomel already given.

Treatment connected with Physicking.—The intestines should always be prepared for this operation by bran mashes given for one or two days previous; which greatly assists the action of the physic. Horses are, some of them, purged more easily than others; hence the first purge should be mild, for, if it does not operate, it does no harm, though it is often erroneously supposed to do so. Exercise is of particular importance in physicking: but I would caution against active trotting; brisk and continued walking is to be preferred. The importance of exercise is by no means sufficiently considered; half the quantity of any cathartic, with plenty of walking exercise, will operate nearly as much as double without; so that the degree of purging may be always regulated nearly to our wish, which is a very desirable circumstance. When physic does not work kindly, exercise should be repeated at short intervals of two hours, till it does; and then should be altogether omitted, as it would fatigue. Cold water should never be allowed, but, if the horse will not drink it warm, it may be cool, but never cold. During the working of the physic, he should be kept warm, both by the stable and by clothing, and he must be exercised (if in winter) in clothes proportioned to the cold.

When a purge is to be given, proceed as follows:—The horse having fasted an hour or two in the morning, the ball is to be given him; after which he should be offered some warm water; or it will not be improper to let him have his ball a quarter of an hour after he has had about half his usual quantity of water; for it sometimes happens that the ball disgusts, and then he will not drink for

some hours after, which is not so favourable. After the ball is given, he should be fasted another hour, or an hour and a half, when a small quantity of good hay may be allowed, or a bran mash, with a very few oats sprinkled in it, to make it palatable: he should, at noon, be walked for half an hour with hay or mash feeding, and exercised again half an hour in the evening, being allowed warm water at intervals during the day, and hay and bran mashes again towards night.

Early on the following morning the physic will probably begin to work, which if it does briskly, no more exercise need be given; but if not, half an hour's walking should be allowed, when the horse may have a mash, and his warm water. After this, another half hour's exercise should be given (walking only), and which is to be repeated every other hour or two, till the physic works kindly, allowing mashes, clean hay, and warm water between times. Should the horse appear griped and uneasy, a warm clyster of the common kind may be given, which will generally relieve with exercise; but if the griping still continues, which will seldom be the case when good aloes are used, then the following drink may be given:

Sound ale	a pint,
Peppermint water	a pint.

Mix, and give rather more than blood warm.

On the next day the physic will be usually *set;* that is, the horse will cease to purge: should it, however, continue to operate, and with violence, he may have a drench of thin starch, with starch and tripe liquor also as a clyster; but this super-purgation seldom happens when a *proper quantity* of good aloes has been used.

The horse may now return to his former habits, giving him corn at first rather sparingly, with moderate exercise; and, in five or six days from its setting, if the operation has been only ordinary, a *second* dose may be given, which is commonly required to be a *little* stronger than the first. After this, with the same caution, if it is deemed necessary, a *third* dose may be given, which is usually considered a course of physic.

FIRING.

This becomes an important and a very salutary agent in good hands. The practice of firing was not always confined to quadrupeds; on the contrary, it probably was first used on man; and to this day in many countries it is a very popular remedy among human surgeons. In India it is applied over the abdomen for the cure of the ague-cake, which is nothing more than a schirrosity of the liver; it is also used for white swellings and numerous other complaints: nor would it be difficult to prove that we have no remedy in human surgery, except mercury, that can compensate for its disuse. Firing is performed

on horses for two purposes: one for the forming a permanent bandage to a part, which it does by destroying the elasticity of the skin, and lessening its surface; the other is that of raising an active inflammation, and thereby exciting absorption. Sometimes it is used to answer one of these purposes only; and sometimes it is performed to promote both conjointly. The Arabs fire the joints of their young colts to strengthen them, by keeping a constant bandage on the part. Some English breeders of blood horses have done the same. This is an instance where firing is performed for the first purpose. In splents, spavins, and ringbones, firing is used as a strong stimulus to the surrounding absorbents, to remove any extraneous substance lately deposited; hence the bony matter so hurtfully thrown out, which forms such swellings, becomes swallowed up by these vessels, and thus removed. These are instances where firing is used principally to promote inflammation; farther to increase which, it is common in these cases to apply a blister over the firing. In enlargements formed from old and violent strains, we blister the legs both to excite the absorbents to remove the deposit of coagulable lymph; and also, by straightening the skin, to act as a permanent bandage on the part for the future.

The various cases in which firing is found useful, are dispersed through the body of the Work; and it would be unnecessary to enumerate them here. It need only be at present noticed, that as it is a painful operation, so it should never be resorted to but when absolutely necessary; and the more so, as it leaves a permanent blemish. As blisters act in a similar way, except that they leave no permanent bandage; so, when absorption only is required, repeated blistering will often supersede the necessity of firing. It is very usual to blister the fired part immediately, and this is admissible, and even advisable, when there is considerable enlargement, and a necessity for a very strong stimulus to the absorbents, as in cases of bony swellings, &c. But in common cases this may be avoided, and saves the animal much pain. In old strains accompanied with considerable swelling, I have found it advantageous to fire, and to omit blistering till the fourth, fifth, or sixth day, according to circumstances. In firing for the cure of grease, of course, blistering afterwards would be highly improper. The operation of firing is conducted differently in different cases. The cauterization is commonly carried on in straight lines; but these may be perpendicular, or horizontal. In all cases of the fire applied to the limbs, the Veterinary College recommend that the lines should be perpendicular; because as part of the intention is the forming a permanent bandage, so it must be evident that the skin would be more readily and effectually contracted in this manner. There is great propriety in this mode, but it need not to be strictly adhered to, so that the line of fire is not horizontal. In firing the pasterns I generally do it in the penniform manner; that is, I make one line directly down the hind part of the canon, and from this the lines are made to pass around the leg in a very slanting direction towards another line in front. In curbs, splents, and spavins, the fire is

generally carried in lines across each other, at angles, lozengewise. The firing of the stifle is usually done the same, but that of the round bone or articulation of the thigh is commonly made to represent a star for neatness. In ringbones the lines of fire are made perpendicular, about an inch and a half apart; but it is evident, that, when the principle of the operation is understood, the form and direction of the lines may be left to the discretion of the operator. According to the parts to be fired, so there are different shaped irons used: the principal are the *searing iron* for the tail; the *budding iron* for cavities; and the *demi lunette* or common iron. All these are sufficiently known. They should all be sufficiently thick to retain the heat, and should never be heated to a white, but to a red heat only: and in firing in lines, care should be taken that, by repeated heating, the firing iron does not form too sharp an edge, or the skin may be fired through. To prevent the possibility of this, after each heating, the edge should be rubbed moderately, to round it, and also to remove any loose scoriæ that may be attached. The best mode of heating the irons, of which there should always be three or four, is by means of a charcoal fire in a chafing-dish, placed not far from the operator. This will save much trouble, and greatly expedite the business. I must again caution the young practitioner to let no consideration induce him to fire through the cuticle: if the cutis or true skin is wounded, a very considerable inflammation and ulceration follows. To prevent this, when the iron is very hot, pass it more quickly and lightly; but as it cools, draw it more leisurely and with a greater pressure. Old spavins and ringbones require the severest firing; but in these cases even, it should never be carried through the skin. I have sometimes fired a spavin with a sharpened budding iron, in which case I have perforated the skin purposely; but it has only been in very bad cases, as a desperate remedy, and it has always excited very considerable inflammation. Sometimes good effects have followed, and sometimes I have gained no more benefit than I should from the usual mode; and one or two I injured by this means. The proper depth of the line of fire may be easily known by the colour it produces, which is a yellowish brown, not unlike that of the coloured buckskin breeches lately worn. In all cases, the hair should be cut closely from all the parts that the fire is to pass over: without this precaution, the smoke will impede the sight, and the lines will not be easily drawn correctly. Some chalk each line first, and I would recommend this to the junior practitioner. When it is not deemed prudent to blister immediately after the firing is over, nothing more need be applied unless the weather is very hot, in which case a small quantity of tar may be rubbed on, and some loose tow wrapped over, which will keep the flies from annoying the part. In two or three days rub in daily some oil, or other greasy matter, to prevent a cracking of the skin.

BLISTERING

Is an operation of great utility, and is, perhaps, the safest that is performed. *Blisters* act by inflaming the skin, which, drawing a large quantity of blood to the part; its watery portion, or serum, is separated, and this forms the running. At the same time, likewise, that a blister acts on the skin, it stimulates the surrounding absorbents to take up other fluids; and if the blister is strong, and they are much excited, these same absorbing vessels remove even the solids likewise.

Mercury is known to stimulate these vessels more than most other substances; therefore, when we wish particularly to stir up the absorbents to remove a hard part, we make use of a *mercurial blister;* such are therefore used for splents, spavins, curbs, ringbones, &c.

It is a law in the animal economy, that two inflammations seldom exist in the vicinity of each other; therefore, when such an affection has taken place in any part, and we wish to remove it, we attempt to raise an artificial inflammation in the neighbourhood by means of blisters; which, if we effect, we remove, or at least lessen, the original one. Therefore, in inflammations of the lungs, bowels, &c. it is proper to blister the chest, belly, &c. very extensively, by which means the inflammation may be removed from the vital organs to parts of less importance.

The *blister* for general use in veterinary medicine, as a simple stimulant, should for these cases be composed of Spanish flies only. (See *Blisters*, in the *Materia Medica*.) Cheaper substitutes are used; but they irritate violently, and in extensive inflammatory affections, they are on this account perfectly inadmissible. *Blisters* are *solid* and *liquid*. (See *Materia Medica*.) The solid are those in common use for the purposes already noted. The liquid are called *sweats*, and are not intended to act hastily, nor to raise the skin, but merely to irritate the surface. Liquid blister is also used as an injection in fistulous sores.

The mode of blistering is sufficiently known; the hair should be cut as close as possible from around the part; the blistering matter should then be well rubbed in for ten or fifteen minutes; on which thorough application much depends: having done this, smooth it down, and spread a little more on the surface with a spatula. If the pasterns and fetlocks are the parts to be blistered, previous to rubbing in the ointment, smear some lard, tallow, or melted suet, over the heels, and within the hollow at the back of the small pastern. This will often prevent grease or troublesome sores forming, from the blistering ointment falling on these parts. Another caution is also necessary to be observed with regard to this operation, which is, that when a horse is much out of condition, particularly in the autumn or winter, and is blistered behind, it is very apt to degenerate into grease, and to produce much trouble. In such cases, therefore, if

blistering cannot be avoided, much caution is required in the operation, as well as to *prepare* the animal for it. While a blister is acting, the litter should be removed from under the feet, or it will tickle the legs and irritate: the horse should also have hay or other food constantly before him, which will draw off his attention and quiet the pain; but, above all, his head ought to be most carefully secured, for two days and nights, to prevent him laying down; but more especially to prevent him biting the blistered part. Unless this is particularly attended to, the irritation will make him tear and disfigure himself much. On the third evening, he may be permitted to lie down; but a prevention should even then be continued, by means of what is called a cradle, which should be put on the moment the blister begins to be troublesome. It may be bought ready at turning shops; or may be made of eight or ten pieces of round wood, an inch and a half in diameter, and two feet long. These are strung at each end on a rope, and fastened round the neck, by which the horse is effectually prevented from bending his neck to bite or tear himself. When it is intended to blister a second time, the effects of the first should have completely subsided before it is done: the swelling should have abated, the scurf and scabs be cleared away, and the part well washed with soap and water, which will clear it from any matter that might obstruct the action of the blister. In all cases, the third or fourth day after a blister has been applied, the part should be well rubbed with some lard, palm oil, or other greasy matter, to prevent the skin cracking and chapping; and when it is proposed to turn a horse out after, it should never be done until the whole blistered surface is quite healed, or the dirt and flies may prove hurtful. It remains to add, that in blistering for bony swellings, as ringbones, splents, spavins, and also for ligamentary enlargements called callusses, I would recommend to rub the part well with mercurial ointment once or twice a day for a week or ten days before the blister is applied; by which means the efficacy and action of the blister are greatly increased.

I know some practitioners who blister mildly one day, and on the next wash off the blistering matter, and thereby save the loss of hair. But there is more of appearance than of reality in this plan. If a blister is requisite, it requires all its activity; if it can be dispensed with, and yet some stimulant is wanting, use the following, which will equally save the hair, and promote a longer action.

Sweating Blisters.—This technical term is made use of among farriers, to imply a moderately active stimulant, generally of a liquid kind, that will not excoriate, raise the cuticle, or cause a separation of hair; and yet will rouse the absorbents, and occasion, as is supposed, a transpiration of fluid matter, or a *sweating* effect, whereby accumulations are removed in the latter stages of muscular and ligamentary strains, as those of the shoulder, hip, stifle, and some others; in which, it will be seen, I have sometimes recommended this plan. The mode I generally adopt to effect it, is this: I apply the liquid stimulant (see *Sweating Blisters* in *Mat. Med.*) of a strength adapted to the irritabi-

lity of the skin, which varies much in different habits; rubbing in daily a sufficient quantity, so that on the third or fourth day, but not before, a considerable tumefaction or swelling shall appear. I then desist, and suffer the swelling to subside, when I generally find that it takes with it, all the enlargement previously existing, as well as the lameness; if not, I repeat it.

All lesser matters in operative farriery may be found distributed under their several names in the *Veterinary Materia Medica.*

When I had completed the anatomical detail of the present Work, I paused a little, to endeavour to impress on the student's mind the importance of the subject treated on. Having now brought this more interesting part to a close also, I may with propriety again attempt to arrest his attention, and to point out to him the still greater importance of this subject, as well as the absolute necessity there is, for his future well doing, that he should make himself fully master of every part of it before he proceeds on his professional career. Any attention he pays to this during his novitiate, will be amply recompensed by the success that will attend his future endeavours. Having previously grounded himself with *principles*, every succeeding case will afford him further opportunities of improvement; and that he may avail himself of the benefits resulting from his own experience, I would strongly recommend to him that he carefully notes and sets down in a *case book* the practice employed in every disease that comes before him; with its leading symptoms, progress, and termination: these notes may be afterwards revised, and arranged under their several heads and classes; by which he may at any time, and at one view, see what appears worthy of repetition, and what presents itself as a matter to avoid. Finally, by neglecting no opportunities for improvement, and by a steady undeviating course, founded on integrity towards his employers, and humanity towards the animals concerned, he will gain esteem, reputation, and emolument. The pleasing consciousness will also arise, that he has proved useful in his day and generation, and has tended to ennoble the art he professes.

PART THE FOURTH.

THE

Veterinary Materia Medica,

OR

AN ALPHABETICAL AND DESCRIPTIVE LIST

OF THE

Various Medicinal Articles

AT PRESENT IN USE IN VETERINARY PRACTICE.

THE

VETERINARY MATERIA MEDICA,

&c.

THE veterinary art is even yet so much in its infancy, that the operations of a few medicinal agents only are at present familiar to us; and some time will probably elapse, before any thing like a complete and systematic *Materia Medica* can be offered, for the use of the veterinary student. Were I therefore not irresistibly impelled by what I consider an imperious duty, I should now gladly rest after my arduous and voluminous undertaking. But as I believe it is the fashionable doctrine at the Veterinary College to condemn the use of many articles as inert, which the experience of myself and other observant practitioners has fully proved to be most active and salutary in their operation on the body of the horse; so I feel it incumbent on me to extend my labours, and to present the following descriptive catalogue of such medicaments as *my own* experience enables me to point out as worthy of the practitioner's notice. I have introduced in this part but very few *recipes;* for it is the express intention of this work to teach the practice of the art on *principles*, and not on *receipts*, which are but the bolsters to ignorance and empiricism. Nevertheless, as a guide to both the junior practitioner and the amateur, a few are added, for the efficacy and conveniency of which I can answer.

I would strongly recommend to the veterinarian setting out in life, to have a neat and well regulated dispensatory. Except that the matters need not be quite so numerous, it should be a fac simile of a well arranged apothecary's shop. The various articles should be enclosed in drawers, pots, or bottles, according to their forms or properties: each should be separate, and each should be distinctly marked. Above all it behoves him, if he wishes either to satisfy himself, or to do justice to the cases under his care, to be most particular as to the *quality* of the *simples* and *compounds* he uses. On this too much stress cannot be laid; for as it has been justly observed, any thing is thought good enough for a horse; and hence no medicinal articles are so shamefully adulterated as those intended for his use. In fact, the prudent veterinarian will do well never to purchase what are technically called *horse medicines:* on the contrary, he should procure every medicinal article from a druggist of established reputation, and should specifically order them all to be of the very best quality.

The travellers of wholesale druggists are apt to call on veterinarians and farriers, and tempt them by offering *horse oils* and *horse powders* at a *cheap* rate. Such offers should always be rejected. The established trader must, and ought, to have his fair profit; and whenever any attempt is made to sell a known article at an under rate, either it must be adulterated, or the trader must cheat himself; a practice not very usual. Horse powders as they are termed, horse oils, and all medicines in common use among animals, can be sold at any price; for they are very generally adulterated by farriers' druggists, to suit the pocket, the credit, or the tastes of their customers, whose usual ignorance of chemistry and pharmacy makes the imposition the more easy. The only means to avoid such deception is to deal with a druggist of established reputation; and to peremptorily give directions for the best articles, and to pay for the same punctually.

In the formulæ, and doses, the apothecaries weights and measures are always meant, a table of which is added as a guide. I would also recommend to those whose knowledge of pharmacy is limited, to procure a complete set of weights and measures of apothecaries use, marked and graduated in *English* characters. Such are now sold at scalemakers, and prevent the possibility of mistake.

It would have appeared more scientific, and in a more advanced state of the art it would perhaps be proper, that each article should stand under the pharmaceutical name of the London Pharmacopœia: but I have been particularly studious throughout to *simplify* the attainment of the necessary information, to those whose opportunities may not have been extensive. I have therefore described most of the articles under their popular English name, immediately adding, however, that under which it may be found in the London Pharmacopœia.

A TABLE *of the* WEIGHTS *and* MEASURES *generally used in* PHARMACY.

WEIGHTS:

The Pound	contains	Twelve ounces.
—— Ounce		Eight drams.
—— Dram		Three scruples.
—— Scruple		Twenty grains.
—— Grain		

MEASURE OF FLUIDS:

The Gallon	contains	Eight pints.
—— Pint		Sixteen fluid ounces.
—— Fluid ounce		Eight fluid drams.
—— Fluid dram		Sixty minims or drops.

ABSORBENTS.—The efficacy of this class of remedies is supposed to consist in their tendency to correct a diseased acidity in the sto-

mach; but as this organ in the horse has but a small portion of secreting surface, so he is less liable to affections of this nature than many other animals. In horned cattle, complaints apparently originating from this source are more common; hence cows, calves, and sheep, are sometimes benefited by chalk; which is the most usual antacid in veterinary practice.

Acids.—In chemical language these are a class of salts; but, familiarly, they express whatever produces the sense of sour to the taste. They are gained from the animal, vegetable, and mineral kingdoms. Such as are in use in veterinary medicine, are described under their popular names throughout the *Materia Medica*.

Ægyptiacums are mixtures of verdigris and honey, sometimes with vinegar, borax, alum, &c. The simple ægyptiacum is used for ulcers of the mouth, the others for grease, cracks, &c.

Æther.—The volatility as well as the expense will ever prevent the sulphuric æther from coming into general use in veterinary practice; but the more dilute preparation of it, called *spirit of sulphuric æther*, may be often used with great benefit in spasmodic colic, in addition to the other means. The *nitrous æther*, or sweet spirit of nitre, as it is called, is a more general remedy, and will probably become still more so as it is more known. As a febrifuge, it is at once cooling without lowering. (See Nitre). A dram of sulphuric æther to eight ounces of rose water makes an excellent collyrium for the latter stages of ophthalmia.

Æthiops Mineral (*Sulphuretum hydrargyri nigrum*).—This is very little used in horse practice, both on account of its cost, and because its virtues are not sufficiently known; but in surfeits, and some other cases of what are called foulnesses, six drams of it with twelve of cream of tartar, given daily, forms the best possible alterative.

Aloes.—These are a very important article in the veterinarian's list of medicines, and therefore too much care cannot be taken to procure them genuine. Every practitioner, however, should purchase them in the gross, and have them reduced to powder under his own inspection, as the surest preventive against adulteration. Aloes are of three kinds; Socotrine, Barbadoes, and Cape. Formerly the socotrine were recommended, and the other kinds condemned as unsafe: but the Barbadoes are now in most request, as being the most certain in their action; principally, I believe, because they are less adulterated. Socotrine aloes appear in colour compounded of red, brown and yellow; are very brittle and fragrant to the smell. Barbadoes aloes are of a deeper tint, less brittle, less fragrant, and more intensely bitter. Cape aloes in appearance hold a middle place between the two, and indeed what are so called are in many instances compounded by druggists of the refuse of both, and to which may be perhaps attributed much of their uncertainty. The action of each kind as a *purgative* is detailed under the head *Physicking*. As an alterative, a stomachic, or a vermifuge, aloes are sometimes given in doses of one dram to two daily: as an external detergent and stimulant application, they are used in the compound tincture of myrrh, and in friars balsam also. Aloes

will not powder readily except in frosty weather, at which time a sufficient quantity should be done to last the year through; and as they are apt again to unite into a solid mass; so, as soon as pulverized, they should be mixed with something. I have always used for this purpose half their weight of lard, or palm oil: mixed in this manner they keep well, and form a uniform mass of a proper consistence to make balls; which dissolves readily in the stomach, never hardens, and is, I think, less apt to gripe than any other form.

A watery solution of aloes should be kept by every veterinarian, and which will be found in many instances a very convenient form; as well as desirable on account of its quicker action. It may be made by grossly powdering a pound of the mass, and infusing it in a warm place in one pint and a half of proof spirit for three or four days: after which add soft water two quarts, and bottle for use. When to be taken, shake the vessel containing it, and give sediment and all, in doses of two, three, or four ounces, as the case may require.

ALTERATIVES are articles that are supposed to act medicinally on the body, in a slow and nearly imperceptible manner. The usual alteratives among farriers are nitre, antimony, sulphur, resin, and spices: but a better acquaintance with the art teaches us to add mercurials, arsenic, foxglove, wood barks, with some of the gums, and gum resins. A change also in the food becomes in some instances a powerful alterative. *Nitre* in doses of two to six drams increases the urinary discharge, and thus keeps down the accumulation of fluids in swelled heels and other œdematous enlargements. *Antimony* is given in several forms. The sulphuret, or what was called crude antimony, has been long a common alterative. It is still given in doses of two to six drams, in skin affections, as hidebound, &c. Antimonial powder, and emetic tartar, which are both prepared from this (see ANTIMONY), are also excellent skin alteratives in doses of one to two drams. *Resin* is an active and useful diuretic alterative, in doses of two to three or four drams; but it simply empties the system, while nitre is a refrigerant also. Cream of tartar is an excellent alterative, particularly in conjunction with mercurials and sulphur, in breakings out, surfeits, &c. &c. *Spices* are used by ignorant persons to produce a fine coat; but if they have any effect of this kind, it can only arise from the stimulus they afford the constitution; consequently they are in such hands very dangerous. Mercurial alteratives are principally calomel and corrosive sublimate. *Calomel* is useful in all herpetic affections, and as a vermifuge also, in doses of a scruple to a dram; but its effects must be watched, or salivation may unexpectedly come on. *Corrosive sublimate* may likewise be given in similar cases, and in farcy, glanders, grease, &c., in doses of ten grains to a scruple, watching its effects even more attentively than the former, as, in addition to salivation, it may produce inflammation of the stomach. *Arsenic* is not only given with the same intents as the last article, but as a tonic its effects are also very considerable, particularly in cases of protracted debility from chronic

diseases. It is also a useful anthelmintic. The dose is the same as of corrosive sublimate, and similar cautions are to be observed in its exhibition. Foxglove is likewise a useful alterative in watery accumulations, in doses of two scruples to a dram.

Diuretics, diaphoretics, laxatives, stomachics, and tonics, may be all likewise considered as alteratives.—*See these articles.*

Alum *(Alumen)*.—This compounded body from sulphuric acid and pure argil is in very general use in veterinary practice, both externally and internally. In doses of one or two drams, it is an useful astringent in diarrhœa, diabetes, and other fluxes. It also possesses some virtues as a stomachic. Externally it is used as a styptic to stop hæmorrhage, by sprinkling it on the bleeding orifice, when its coagulating properties plug up the mouth of the vessel. It is a useful escharotic to destroy fungus, and a valuable detergent for foul ulcers. It is also a useful stimulant in inflammations of the eye; and a whey made of it forms a good astringent clyster.

Alum, burnt (*Alumen exsiccatum*).—When burnt, alum is rather milder, but its properties are not otherwise materially altered.

Ammonia (*Ammonia carbonas*).—The gazeous ammonia, fixed into a solid form by combination with carbonic acid, forms the volatile ammoniacal salt of the druggists. It has been said to be a good stimulant in the latter stages of fever; but I have never tried it alone: united with vinegar, it forms the spirit of Mindererus, and becomes then, indeed, a most excellent febrifuge.—See Mindererus's Spirit.

Ammoniacum.—This *gum* is sometimes given in old obstinate coughs, but I have no evidence to offer of its efficacy.

Anise Seed.—The powder of these seeds was formerly much used by farriers, and the druggists who make *horse powders* find it a profitable article; for it is adulterated to one third only of the genuine powder. It may be very properly united with other warm aromatics when cordials are admissible. It is also thought to possess some pectoral properties, but they are very trifling. The essential oil is the most active preparation of it; which see.

Anodynes.—These are medicines that quiet pain. In the human, they procure sleep also, but no article with which we are acquainted is capable of producing this effect on the horse; whose stomach having but little secreting surface, on which almost all anodynes first act by a sympathetic effect, so, in him, this class is not very numerous. Nevertheless, here also the grand anodyne of the human, which is *opium*, must be the sheet anchor of the veterinarian. Camphor and æther will likewise mitigate spasm (see Antispasmodics and Narcotics); but in all painful affections, where relief is essential, opium in doses of one, two, or three drams, is chiefly to be depended on.

Anthelmintics, or *Worm medicines*.—These are, tin or pewter, or iron filed fine, but not levigated, two or three ounces. Common salt, six to eight ounces. Oil of turpentine, two to three ounces. Savin, one to two ounces. Cowhage, half a dram. Calomel, a scru-

ple. Arsenic, ten grains. Aloes, two drams. Worm medicines should be given fasting, every day, for a fortnight.—See WORMS, in the DISEASES.

ANTIMONY (*Antimonii sulphuretum*).—The sulphuret or crude antimony is now very generally levigated after it is powdered, which considerably improves it. It has long been used as an alterative in doses of six drams to ten. Antimonial powder (*antimonium oxydum*) is a preparation from the crude, similar in qualities to Dr. James's celebrated powder, and affords the veterinarian an excellent febrifuge in doses of one to two drams. Emetic tartar (*antimonium tartarizatum*) is another and still more valuable agent in horse practice, although its efficacy is most erroneously questioned by the Veterinary College. In inflammatory affections, but particularly in catarrhal and pneumonic ones, its virtues are extreme in doses of one dram to two. In larger doses, it sensibly lessens the pulse. Butter of antimony (*murias antimonii*) is a caustic liquid preparation well known.—See CAUSTICS.

ANTISEPTICS are remedies supposed to possess a power of resisting a putrefactive process in the body; but this disposition is questioned, and all medicines of this class are now considered as acting only by their stimulating qualities.—See TONICS and STIMULANTS.

ANTISPASMODICS.—The horse is not subject to many spasmodic affections, and the class of remedies that applies to the few he is troubled with is small. Opium stands first on the list. Camphor, æther, oil of turpentine, and asafœtida, have all of them likewise proved useful. Cold also, in an intense degree, is a powerful antispasmodic, for which reason we apply it in tetanus.

APERIENTS.—See LAXATIVES.

ARSENIC (*Arsenici oxydum*).—This very powerful medicament has been but lately properly appreciated. It is now known to be an excellent tonic, in doses of ten grains to thirty daily, in a very fine powder. Much more has been given; but as it sometimes appears to remain in the constitution, until it is fully saturated with it, when it commences it noxious effects suddenly and irreparably; so it is always prudent to exhibit it with great caution. Nor should it ever be given on an empty stomach. It has the power of staying the progress of glanders, and it ultimately cures farcy. It appears also to have some vermifuge properties; and there is reason to suppose that it may in time prove an antidote to some animal poisons. Externally, it assists other applications in the cure of mange.

ASAFŒTIDA.—This *gum* is a minor antispasmodic.

ASTRINGENTS.—These are supposed to act on the living fibres by producing increased contraction in them, in which point of view they form a very numerous and important class; but in a more limited sense, they are considered as substances that restrain immoderate fluxes, as of the intestines and kidnies. Those that act by constringing the divided ends of blood vessels are called styptics. Opium, chalk, alum, starch, and catechu, act favourably in restrain-

ing intestinal fluxes. Catechu, alum, and acetate of lead, operate as astringents on the urinary passages.

Balls.—There are some circumstances in the preparation of this form of medicines, not in general sufficiently attended to by veterinarians. Substances that are volatile do not keep well in balls, and therefore should only be made when used. The same caution is also requisite with such as liquefy by the absorption of air. All hard substances entering into balls should be finely powdered, and the moist matter that is to form them into an adhesive mass should be of a nature that will neither ferment nor become mouldy. Very dry and bulky powders are no way so conveniently formed into a mass, or keep so well, as by the addition of lard or palm oil. Such as are less bulky, and other matters, may be mixed with honey, syrup, or treacle, unless they are intended for keeping some months: in which case, if lard or palm oil is not used, well made conserve of roses forms the best medium. A mass of balls not intended for immediate use should be pressed down into a jar, and tied over with a bladder.

As the giving of a ball is a forcible operation, so, when it is requisite to exhibit medicines more than once a day, it is more prudent to give them in the form of drinks. A horse ball should not be so large as a pullet's egg, but rather longer; nor should it be too hard. Among Veterinary Instruments may be seen a very ingenious one for giving balls, which may be used in every case, but is particularly applicable to colts, ponies, or horses with a small mouth. The common balling iron, used by persons not expert at *delivering* a ball as it is termed, should always be guarded with cloth, to prevent the bars of the mouth from being wounded. *The most convenient mode of delivering a ball* is, to back the horse in his stall, when the operator, raising himself on a stool (the bottom of the bucket is a very usual convenience, but it sometimes falls in, and alarms the horse), should gently draw the tongue a little out of the mouth, so as to prevent its rising to resist the passage of the hand; but it should not be laid hold of alone, or the struggles of the horse may injure it, but should be held firmly by the fingers of the left hand against the jaw. The ball, being previously oiled, must now be taken in the fingers of the right hand, lengthwise, when the hand, being squeezed into as small a space as possible, should be passed up the mouth close to the roof, by which injury from the teeth will be avoided: having placed the ball on the root of the tongue, the hand may be withdrawn, and the tongue liberated, when the ball will pass down. The head should, during the whole, be but moderately elevated: when it is held too high, there is frequently danger of choking the horse.

Balsams are a kind of resinous juice, united with some of the extractive matter of the various plants they are obtained from, in combination with an essential oil. All the balsams are occasionally in use in veterinary medicine, and were formerly in very high estimation, for their supposed salutary action in chronic diseases of the lungs. They were also considered as a sovereign vulnerary for abraded urinary passages. It is the modern doctrine to think their efficacy

overrated, and which is probably in some respects true, particularly as regards their expectorant qualities: nevertheless they are far from being inert; on the contrary, they appear to act very favourably as a warm terebinthinated stimulant. There are balsams of Canada; of copaiva; of Gilead; of Peru; and of Tolu. What is called balsam of sulphur, is merely a compounded preparation of sulphur in oil.

Barbadoes Aloes.—See Aloes.

Barbadoes Tar.—See Tar.

Bark.—Several of the *barks* enter into the veterinarian's list of medicaments; and all act by an astringent property on the animal fibre. Peruvian bark, which stands foremost in reputation, is almost excluded from our reach by its cost; and as horses are little subject to intermittents, so we can more readily dispense with it, particularly as the tonic qualities can be gained from others less expensive. I have used the willow, the elm, and the oak barks, particularly in conjunction with camomile, in cases of debility after fever, with great advantage. Cascarilla and angustura barks prove themselves also valuable stomachic tonics. The elm and oak barks, in decoction, form excellent astringent washes for herpetic complaints, chapped heels, grease, &c. &c.

Bathing is not a convenient remedy for horses. Farriers sometimes mistake a shoulder strain for a dislocation, and think to reduce it by swimming the horse, which commonly increases the evil. Sea bathing is however sometimes found useful in farcy, mange, and hide-bound. And the bathing with cold water, or rather the dashing with it, is now and then beneficial in tetanus.

Basilicon *(Ceratum resinæ)*.—The yellow basilicon is a warm stimulating dressing for wounds not too luxuriant. A black basilicon was formerly also made, in which pitch was substituted for resin.

Beans, in a medical point of view, are sometimes used as a tonic, and the flour of them as a restringent.

Benzoin.—See Gums.

Blisters.—The *action* of blisters, and the cases in which they are properly applied, are detailed under the operations. The *substances* used for this purpose are various; the most important are Spanish flies, whose action is so certain and mild, that, as a simple vesicatory for internal inflammatory affections, every thing else is totally inadmissible. Euphorbium, which is the general substance introduced as a substitute for a portion of flies, is sufficiently active; but it irritates, and therefore ought never to be employed in these cases. However, in common blistering for strains, &c., where the expense of cantharides is objected to, auxiliary vesicatories may be admitted.—(See Spanish Flies.)

No. 1.—*An excellent Blister for general Use.*

Powdered cantharides	one pound,
Venice turpentine	ditto,
Resin	ditto,
Palm oil, or lard	two pounds.

Melt the three latter articles slowly together, and, when not too hot, gradually mix the cantharides or flies.

No. 2.—*A strong cheap Blister, not proper in Fevers.*

Powdered euphorbium	three ounces,
Oil of vitriol	two drams,
Spanish flies	one pound,
Palm oil, or lard	three pounds,
Resin	three pounds,
Oil of turpentine	eight ounces.

Melt the resin with the lard or palm oil, after which add the turpentine. Having previously mixed the oil of vitriol very gradually with an ounce of water, as gradually add these to the melted mass, which again set on a very slow fire for ten minutes more: afterwards remove the whole, and, when beginning to cool, add the powders previously mixed together.

No. 3.—*A Mercurial Blister for Splents, Spavins, and Ringbones.*

Of either of the former	four ounces,
Corrosive sublimate, powdered finely	half a dram.

No. 4.—*Liquid Blister, strong.* (See Sweating Blister.)

Spanish flies, in gross powder	half a pound,
Oil of turpentine	two quarts,
Olive oil	one quart.

Steep the flies in the turpentine three weeks; strain off, and add the olive oil.

No. 5.—*Liquid Blister, mild.*

Of the above	one pint,
Olive oil	a pint and a half.

No. 6.—*A Mustard Blister or Poultice, to be applied in cases of emergency, when blistering ointment is not at hand.*

Mix half a pound of flour of mustard into a paste, and apply hot. It may in some cases be strengthened by the addition of two ounces of oil of turpentine.

Blue Vitriol (*Cupri sulphas*).—The sulphate of copper appears to be a valuable tonic; indeed, in the practice of the Veterinary College it has superseded all others; perhaps its cheapness has gained it a preference. However, in doses of four to six drams, it often produces a salutary effect on a debilitated system. *Blue stone* is a technical name given to this article by the older farriers, when they mean to express its escharotic qualities.—See Caustics.

Bole Armenian, vulgarly called bole armenic, is an argillaceous earth impregnated with iron; and was formerly extolled for its astringent strengthening qualities, both externally and internally; but, although it has some small claim to attention, it is seldom now used except in charges.

Bran.—Independent of the use of this as an article of food, it may be here introduced as a medicine also, being mucilaginous and aperient; and hence is called cooling.—See Mashes.

Burgundy Pitch differs so little from resin in its qualities, as to need no particular comment.—See Resin.

Butter of Antimony (*Antimonium muriatum*).—The muriate of antimony is a very well known liquid caustic.—See Caustics.

Calamine, prepared (*Lapis calaminaris*), is an ore of zinc, that, when reduced to a fine powder, may be very usefully sprinkled on excoriations, and on cracks of the heels, to dry them. It is, however, most frequently used in the form of the unguent called Turner's cerate; which see.

Calomel (*Hydrargyri submurias*).—This submuriate of quicksilver is a very useful medicine in horse practice, but is liable to some uncertainty in its action; therefore, in cases in which its use is to be continued, it should only be given in doses of fifteen to twenty grains daily; and even then should be carefully watched; for the moment the gums look red, the mouth feels hot, and a tenderness is observed in chewing, it should be immediately discontinued. Calomel has not much effect as a vermifuge beyond its purgative properties; but it is an excellent alterative in skin affections, as hidebound, surfeits, &c. It has proved useful also in farcy, grease, and œdema. I have used it successfully likewise in constitutional ophthalmia, both externally and internally. It is often united with purges, and, in such cases, I prefer to give it in a mash on the evening preceding the morning the purge is to be given. Two drams are a proper quantity in such cases, but it must not be forgotten to subtract something from the strength of the morning purge. During the use of calomel as an alterative, the horse should not be exposed to wet or cold. It remains to add, that, unless this article is purchased from a druggist of reputation, it is very apt to be adulterated.

Camomile.—If I do not very wrongly appreciate this vegetable, it unites in an admirable degree the qualities of a stomachic and febrifuge. In weakness of the stomach and bowels, it is a most excellent tonic, in doses of an ounce and a half once or twice a day, particularly in conjunction with iron. In fevers, but more particularly in the debile stage of catarrh that succeeds the first inflammatory attack, and when the purulent discharge has appeared, it proves a most valuable assistant to the other medicines prescribed. In conjunction with Mindererus's spirit, it forms the best febrifuge for the secondary stages of fever in general, with which we are acquainted.

Camphor is an Indian produce, chiefly extracted from the *laurus camphora*. It is a narcotic to the horse as well as to the human, but only in very considerable quantities. In moderate doses, as two drams, it proves antispasmodic, and therefore may be usefully employed in flatulent colic, in conjunction with other remedies. United with opium, it has acted beneficially in spasmodic constrictions of the neck of the bladder not dependent on inflammation. It has also been highly spoken of as a powerful remedy in locked jaw; but though I have fully tried it in these cases, I am not able to say much in its favour. It has on very respectable authority been warmly praised for its virtues in fever; and as it is certainly a stimulant in moderate

repeated doses, so in the latter stages of febrile complaints, where the debility is considerable, it may be very properly given. But in the more early stages its beneficial action is questionable: nor are its powers sufficient as a permanent stimulant to be depended on at any time without other auxiliaries. Externally it proves a mild discutient, in indurations and rheumatic affections; and I have also experienced advantage from its use in collyriums for inflamed eyes.

CANTHARIDES.—See SPANISH FLIES.

CAPSICUM.—In Indian horse practice, an infusion of Cayenne pepper is often given as a cure of flatulent colic, and as a vermifuge also; it is likewise used externally as a stimulant. I have myself tried it in colic with some advantage, but not with sufficient benefit to prefer it to the more established means. As a stomachic, it is decidedly inferior to the other spices.

CARAWAYS.—Both the seeds and essential oil are used as warm stomachic cordials.—See CORDIALS.

CARROTS.—These become, under many circumstances, a medicine, as well as an article of diet. Even for the latter purpose they are not sufficiently known; for they fatten without heating; but, on the contrary, keep the body cool and open, and greatly promote a healthy coat. As a *medicine* they often remove cough, cure incipient grease, are good in farcy, and beneficial in surfeits and mange; but in these latter cases they must be wholly substituted for corn. A *poultice* formed of the scraped root is an excellent application in cases of ichorous discharge from the heels.—See POULTICES.

CASTOR OIL (*Oleum ricini*).—This valuable article is expressed from the seeds of the *palma christi*, and is scarcely less necessary in veterinary than in human pharmacy. The price of it is too apt to prevent its use; but when semitransparent, and of an indifferent colour, it may be procured cheap enough, and yet of good quality: but in such cases double care is requisite to ascertain that it is genuine. In inflammation of the bowels, this aperient, and mild neutral salts, are the only internal remedies admissible. In spasmodic colic also, in conjunction with other matters, it is hardly less salutary: in fact, it appears to have a particularly sanative effect on the bowels in most of their complaints. In cases of the imperfect dysentery to which horses are subject, it is peculiarly useful; the first dose being given alone, the second and third joined with opium and demulcents. The *dose* is from half a pint to a pint, and the most convenient mode of giving it is by trituration or rubbing it with coarse sugar, two ounces to a pint of the oil, gradually adding half a pint of thin gruel on the mixture.

CATHARTICS.—Whatever excites the intestines to a more early, a more frequent, and a more copious discharge of their contents, may be termed a *cathartic*, or purge. If this effect is intended to be produced in a slight degree only, the article effecting it is termed a *laxative*; which see. The principal cathartic in veterinary practice is aloes. Castor oil, calomel, and neutral salts, may be rather considered as laxatives.—See PHYSICKING, ALOES, &c.

Catechu.—By universal suffrage this has long been called *japan earth;* although it is an extract from a species of Indian acacia. It is a very mild but tolerably certain astringent; and its effects are, I think, even more certain on brutes than on the human subject. It acts favourably in relaxations of the urinary passages, and also in alvine fluxes or diarrhœa; in which latter cases it should be united with chalk, in doses of an ounce.

Caustics.—In the human materia medica, these are described as *escharotics;* but, as this is the most familiar term, and our art is not sufficiently advanced to adhere strictly to an academic form; so we shall under the term *caustics* consider such substances as erode or destroy the animal solids, and in general coagulate the fluids also. The caustic articles are numerous, but we shall notice only such as are particularly useful. The *mineral acids* are active caustics. *Oil of vitriol* is sometimes mixed with blistering ointment and with other matters, to hasten their stimulating effect. *Aquafortis*, or nitrous acid, may be used in a similar way. *Butter of antimony*, or, more properly, the muriate of it, is an escharotic or caustic in very general use among farriers. Applied to a raw surface, it instantly changes it white, destroying a thin layer of substance; hence it is a very convenient application in cankered feet, as, by means of a small camel's hair brush, it can be spread over as much or as little a portion of parts as is necessary. In sandcrack, when the sensible substance protrudes, it may be applied in a similar way. For the cure of corns, after the bruised portion has been removed, it likewise proves particularly useful. In obstinate cases of grease, the buds are sometimes beneficially touched with it: but in quittor, pole evil, and other sinuses, it is not so proper as some other escharotics.

Lunar caustic.—This is a nitrated preparation from silver, which renders it expensive: it is, however, essentially necessary to the veterinarian's dispensary, from its being so completely under command in its action, not extending its effects beyond the immediate part it is applied to. It proves the most convenient caustic for destroying the edges of a contaminated wound, when not too extensive, as the bite of a rabid animal. Dissolved in five, six, or eight times its own weight of water, it forms an excellent liquid caustic, peculiarly useful as a dressing for the foot rot in sheep, and also to touch the protruded portions in sandcrack. Dissolved in twenty times its weight of water, it makes a useful detergent wash for foul ulcers, and to keep down too luxuriant surfaces.

Lapis infernalis, or caustic potash formed into a solid body, is also another powerful caustic, quicker in its action than the lunar, and therefore more convenient for extensive action; but its ready liquefaction renders it unfit for tedious operations or deep seated parts. Made into a paste with soap, it forms a useful escharotic to insert into the pipes of a quittor.

Corrosive sublimate, or oxymuriate of mercury, is a very usual caustic employed, and is, perhaps, one of the best for coring out of quittors; it also enters into the formation of very active blisters.

In strong solution it is an excellent application for grease, often curing when every other means have failed.

Red precipitate is also another preparation from mercury, and in very general use as an escharotic in horse practice. Sprinkled over very foul surfaces, it changes them quickly into a better state; and it acts equally beneficially on luxuriant sores, by destroying fungus, for which purpose its form of a powder renders it very convenient.

Blue vitriol, or the sulphate of copper, is a much milder escharotic than some others, and much used to destroy fungus, both in powder and solution. A milder solution, of a dram to six ounces of water, makes a detergent lotion for ulcers, as grease, &c.

Quick lime is sometimes used as an escharotic substance, for sprinkling over ulcerated surfaces, as cankered feet, &c.; for which purpose it is convenient, from its property of absorbing the moisture.

Cerates are ointments of a drying healing nature; the principal of which is Turner's or calamine cerate.

Chalk.—This is a carbonate of lime, commonly used in a prepared state under the name of *prepared chalk*. It is an excellent antacid and astringent, in diarrhœa, dependent on a vitiated state of the stomachic, biliary, and intestinal secretions: in this way it is that it proves so beneficial in the scouring of calves. The dose is from half an ounce to two ounces.

Charcoal has a peculiar property of amending the ichorous discharge from ill-conditioned ulcers, either sprinkled over them in powder, or mixed with a poultice.

Charges are not much used by modern veterinarians; for a more extensive acquaintance with the animal economy teaches us that there is but little activity in what are considered as external bracers. Nevertheless, I think there are some other points of view in which we may place this matter, to prove that *charges* may yet prove of much service in some cases, if it is merely to act as a bandage, or to protect from cold. In this way a *charge* becomes a useful application to the loins in rheumatism; not only as it protects the affected part from cold, but also from the resin in it proving a useful stimulant to the part. Windgalls, old lamenesses, &c., may be still further assisted after firing or blistering, by the continued bandage kept up by a *charge*. Any strong adhesive, as resin, pitch, &c., melted with wax or oil sufficient to keep it from being too brittle, may be formed into a *charge*, and applied warm on the part; and, as it cools, it should be covered with flocks or short tow. The strengthening part of a charge was supposed to consist in adding bole armenian, crocus metallorum, litharge, or other matters; which may be still added if thought proper.

Clysters.—These form very important matters often in veterinary practice, and have the valuable properties of being always safe, and commonly easy to give. From the length of time it requires to open the bowels by purgatives given by the mouth, clysters are often our principal dependance; and also when aperients cannot be given by the mouth,

they become our only resource. Nutriment may likewise be given this way, when circumstances prevent its being received in the usual manner, or when it is requisite to throw a large quantity into the system.

When clysters are given to remove costiveness, it is always proper to back-rake first (see RAKING), as it removes any hardened dung that might obstruct the passage of the liquid. The apparatus made use of in giving a clyster should be a large hog's or ox's bladder, capable of holding five or six quarts, attached to a smooth wooden pipe an inch in diameter, and fourteen or sixteen inches long. The liquor should not be too warm; but the pipe being oiled, the whole must be conducted gently, so that the horse may not be surprised with its being thrown up too suddenly. This is a better instrument for giving an injection, than the pewter syringe made for this purpose by the veterinary instrument makers.

A laxative Clyster.

No. 1.—Thin gruel, or broth . . . . . five quarts,
Epsom or common salt . . . . . six ounces.

A Clyster for Gripes.

No. 2.—Mash two moderate sized onions, over which pour oil of turpentine two ounces.
Thin gruel . . . . . four quarts.

A nourishing Clyster.

No. 3.—Thick gruel . . . . . three quarts,
Strong ale . . . . . one quart.

Mix.—Or,

Strong broth . . . . . two quarts,
Thickened milk . . . . . two quarts.

Mix.

Astringent Clysters.

No. 4.—Tripe liquor, or suet boiled in milk, three pints,
Thin starch . . . . . two pints,
Laudanum . . . . . half an ounce.

No. 5.—Alum whey . . . . . one quart,
Boiled starch . . . . . one quart.

COLLYRIUMS are washes, commonly in use for the eyes.—See WASHES.

CONSERVES.—These are numerous in the human pharmacy; though but few are used in horse practice. The conserve of red roses is however a most convenient medium for forming balls, as it is adhesive, and, when properly made, keeps well.

CORDIALS.—These, with stomachics and tonics, might perhaps all of them be properly defined under one comprehensive term of *stimulants*; for on this property their utility principally depends. The mode of action of all of them in general cases appears to be by a sympathetic effect they excite between the stomach and the system; but as this organ in the horse is not so sympathetic as that of some ani-

mals; so much of their activity is questionable here. Nevertheless, some effect is produced by them; but, as might be supposed, those appear to act best, and most permanently, that are received into the system at large, as generous food, malt, gruel, ale, &c. After this, it may be gathered, that much dependance is not to be placed on what are termed cordials. In compliance, however, with the general prejudice, I have added three formulæ, as good, perhaps, as any.

No. 1.—Gentian, powdered	eight ounces,
Ginger, ditto	four ounces,
Coriander seeds, in powder	eight ounces,
Caraway ditto, ditto	ditto,
Oil of anise seed	half an ounce.

Make into a mass with lard, honey, treacle, or conserve of roses, and give one ounce and a half for a dose.

No. 2.—Of the above mass	one ounce,
Gum myrrh	one dram,
Balsam of Tolu	ditto,

No. 3.—Of the first mass	ten drams,
Camphor	one dram,
Opium	twenty grains.

Either of these may be given as a drink also, by infusing the powders in a pint of ale.

Coriander.—The seeds of the coriander are a warm aromatic stimulant.

Corrosive Sublimate (*Hydrargyrus oxymurias*).—This is the familiar and old name for the oxymuriate of quicksilver, which forms an excellent medical agent in judicious hands. As an alterative, it may be given in doses of ten to twenty grains daily. In glanders and farcy this quantity may be gradually increased to as much as the horse will bear without inconvenience; but as its noxious effects are often sudden, so it must be most carefully watched. It proves also a very certain diuretic in large doses (see Diuretics). *Externally*, also, its effects are considerable. As an escharotic it has already been noticed among *Caustics*. It forms a useful wash for mange, and is an excellent auxiliary to the stimulant properties of blisters, when used for exostosis.

Cowhage.—This has been described as a valuable vermifuge in doses of half a dram to a dram; but it does not appear to me to possess much medicinal activity.

Cream of Tartar (*Potassæ supertartras*).—This has been said to be inert in the horse; but I think the assertion erroneous: on the contrary, I consider it as possessing a high degree of efficacy as an alterative, in doses of one ounce to two, particularly in combination with Æthiop's mineral. It acts also as a mild diuretic, and is therefore very proper in œdematous swellings as well as skin affections, united with nitre, &c. It is likewise a valuable auxiliary refrigerant in fevers.

Crocus Metallorum.—The older farriers gave this in farcy, but it has now given place to more active agents.

Decoctions.—Many herbs are boiled to make decoctions of them. During the boiling, the vessel should be covered; and if the liquor is not intended for immediate use, it should afterwards be bottled, and have a small portion of some spirit added to it.

Demulcents are medicines that act mechanically, by surrounding acrid matter, and thus sheathing it from hurting sensible and irritable parts. In this way, oily preparations act; likewise honey, gums, mucilages, &c. Diluents, as warm fluids, mashes, &c., are also demulcents, because they dilute acrimonious matter, and hence render it less active.

Diapente was an old cordial, composed of gentian, bay berries, bithwort, ivory shavings, and myrrh. When made genuine, there are few better compounds as a stomachic cordial among those in present use.

Diaphoretics are supposed moderately to increase the natural exhalations of the skin. Sudorifics are intended to do it more actively, and to occasion actual sweating, which, in the horse, it proves very difficult to do; but a diaphoretic effect is more easy to excite. Vinegar will however often produce a violent perspiration, but it is not a salutary one; yet the same liquid, neutralized by ammoniacal salts into the Mindererus's spirit, will excite a favourable but mild diaphoretic effect. Antimonials in repeated doses, assisted by diluting liquors and warm cloathing, will commonly produce diaphoresis. Camphor, in considerable doses, will also uniformly occasion determination to the skin.

Digestives are stimulant applications that produce or increase the tendency to suppuration. They are mostly of the warm terebinthinated kind, or the gum resins. Of the former, are turpentine, resin, pitch, and tar: of the latter, are myrrh, aloes, balsams, &c.

Digitalis.—See Foxglove.

Diuretics.—As we have but little power over the skin of the horse, so we have correspondently a greater one over the kidnies. In the human, the very reverse of this is the case, and the articles that do act on the human kidney appear to do it more by a sympathetic effort of the stomach; whereas, diuretics in the horse, at least the greater number of them, appear to act primarily on the kidnies by determining a greater quantity of blood to them, and by stimulating them to separate a larger quantity of water from it. The blood, therefore, losing an unusual proportion of its serum, or watery part, must be supplied from other sources: this is done by the absorbing vessels, which take up, in that case, any superfluous fluids they meet with, to supply the deficiency: therefore, in swelled legs, in cracks, in grease, or in any preternatural enlargements occasioned by fluids, we give diuretics with great advantage.

The principal diuretic substances in the horse are, resin, nitre, turpentine, potash, and corrosive sublimate. The milder ones are, digitalis, tobacco, squills, cream of tartar, neutral salts, juniper, &c. Many other substances act on the kidnies of the horse, but in a less degree. *Resin* is, perhaps, the most active diuretic in veterinary practice, and, in a dose of three to six or eight drams, is very

certain in its operation. *Nitre*, in similar doses, is equally certain, but a little less active. In inflammatory diseases, and in urinary obstructions from gravel, it is also much to be preferred to resin. *Turpentine*, both liquid and solid, in doses of one ounce to three, are pretty certain diuretics; as also is *potash*, one or two ounces being diluted in two or three quarts of water, and given fasting. *Corrosive sublimate* proves a powerful diuretic, in doses of half a dram to a dram; but it is evident no such quantity should be given for this purpose, without first ascertaining that a lesser dose can be borne with impunity. I am disposed to think that the diuretic effect here produced is through the medium of the stomach alone, and not by its primary action on the kidnies; although mercury in all its forms increases the action of other diuretics, in the horse as well as in the human.

As a mild diuretic, the *foxglove* is a good one, in doses of one dram to two, but it requires to be repeated at daily intervals to become certain in its effects. In similar doses, *tobacco* proves a diuretic, but it is less certain even than the digitalis; *squills* are the same. *Cream of tartar*, to prove certain in its action, must be given in doses of four to six ounces. All the *neutral salts*, in similar doses, act in the same way; but not always with uniform certainty. When they prove aperient, the flow of urine is in general inconsiderable.

When strong diuretics are used, it should not be forgotten that they act by over-exerting an important organ; so a frequent repetition of them may prove very injurious, and can only be warranted by some very urgent circumstance, as ascites. Whenever, likewise, a strong diuretic is given, the same cautions should be observed as with physic: to keep warm, to avoid exertion, but, above all, to allow a large quantity of chilled water, which greatly increases the effect, and renders the action less hurtful: indeed, a large quantity of water will of itself prove a diuretic, particularly if the horse has previously fasted from it. Diuretics are given in the form of balls or powders; a formulæ of each of which is added:—

Diuretic Balls.

Resin, yellow	four pounds,
Nitre, in powder	two pounds,
Horse turpentine	two pounds,
Yellow soap	one pound.

Melt the resin, soap, and turpentine, over a slow fire; and when cooling add the nitre. Strong dose, one ounce and a half to two ounces. Mild dose, six drams to eight. The former may be given once a week: the latter every other or every third day.

Diuretic Powders.

Yellow resin, powdered	two pounds,
Nitre, ditto	four pounds,
Cream of tartar, ditto	two pounds.

Dose, six drams to ten or twelve, twice a week, in a mash.

DRENCHES, or DRINKS, are the *liquid* remedies given to brutes. It is not so safe to give them by means of a bottle, as by a horn; as instances have occurred of the neck of the bottle breaking. The head being elevated exactly in the same manner as in giving a ball, and the tongue also held; the drenching horn should be introduced to the hinder part of the mouth, and the contents poured over the root of the tongue; when, still keeping the head moderately elevated, but letting the tongue loose, the drink will be swallowed.

EMBROCATIONS are external remedies applied by rubbing them on the part with the hand, a sponge, flannel, or brush, as occasion suits. The formulæ for them are very numerous, and it would extend beyond our limits to particularize them here; but, in the course of the Work, frequent mention has been made of a *Saline Embrocation*, the recipe for which is as follows:—

Bay salt, bruised	one pound,
Crude sal ammoniac, ditto	four ounces,
Sugar of lead	one ounce,
Vinegar	three pints,
Water	one pint.

Mix.

EMETIC TARTAR (*Antimonii tartarisatum*).—This is a new remedy in veterinary practice, and, I believe, not yet sanctioned by the College. It may, perhaps, be some time before it will; but the practitioner will find full reason for its future employment when he has tried it a few times. It is both a febrifuge and expectorant, and that in a high degree; and, as most of the fevers of horses are connected with some pneumonic affection, so a remedy that combines the properties of diminishing action, and increasing expectoration, is invaluable. In active pneumonia, I unite it with nitre, foxglove, and oxymel, in doses of one to two drams, two or three times a day. In lesser cases, it may be given with nitre and cream of tartar, in similar doses, once a day, in a mash. It is also an excellent alterative (see ALTERATIVES). In full doses it determines to the skin, and ultimately lessens the action of the heart and arteries: sometimes it increases the flow of urine. Externally applied, it powerfully promotes absorption.

EMOLLIENTS.—Remedies that soften and soothe irritation.—See DEMULCENTS and ANODYNES.

EPSOM SALTS (*Magnesiæ sulphas.*)—The sulphate of magnesia, or bitter purging salt, so well known, is a valuable medicine oftentimes to the veterinarian; much more so than the sulphate of soda, or Glauber's salt. In cases requiring a loose state of bowels, but where aloes are inadmissible, as in inflammatory affections; this salt forms the best resource. In fevers it appears to have a double effect; one as a febrifuge, the other as an aperient. It requires from six to eight ounces, dissolved in water or gruel, to open the bowels; and sometimes it is necessary to repeat the dose before the effect is produced. In opening clysters also it may be very properly added.

Glauber's salt possesses nearly similar properties, but is hardly so active, and much less convenient.

Escharotics are known among farriers by the more familiar term of caustics; which see.

Euphorbium.—This most acrid substance is sometimes used as a substitute for cantharides. In blisters for general purposes, where the expense is an object, a portion of it may be admissible; but it irritates extremely, and therefore must never be used in fevers; and I would even in all other cases advise the veterinarian rather to save in any other way than out of the feelings of the animal, whose welfare he is set as a guard over.—See Blisters.

Expectorants.—These are remedies that promote the removal of the irritating mucus formed in the bronchia and trachea, in affections of these parts. The principal of these are tartar emetic, foxglove, Mindererus's spirit, oxymel, and squills.

Extract Saturn.—See Sugar of Lead.

Fomentations are warm fluid applications to an injured part, generally by means of cloths wrung out of the hot liquor, and reapplied as it cools. Infusions of various herbs have been employed for fomentations; but as the good effect is principally dependent on the warmth and moisture, so warm water alone is generally sufficient.

Gamboge.—This gum proves a purgative to the horse; but the same irregularity marks its effects here as in the human, and therefore it should not be substituted for better appreciated articles.

Garlic was formerly much used in chronic coughs by the older farriers; but it is greatly inferior to squills, and therefore now seldom used.

Gentian is a useful stomachic bitter, and was much used in diapente; but it has now given place to articles more highly estimated, or perhaps more in fashion.

Ginger is the best spice in the veterinary materia medica; but even this should be sparingly used. As a warm cordial, it may be occasionally given in doses of two to three drams; and in flatulent colic, in doses of four to six drams.

Glauber's Salt *(Sodæ sulphas)*.—See Epsom Salt.

Glysters.—See Clysters.

Goosegrass, or Clivers.—I have heard it asserted that this is an excellent remedy for obstinate grease; but I have had no opportunity for trying it myself. A pint of the expressed juice is to be given twice a day, and a poultice of the bruised herb applied to the heels every night.

Goulard's Extract. } See Sugar of Lead.
Goulard's Wash. }

Grains of Paradise are a warm spicy seed, much in use among farriers, particularly for horned cattle; and are given by grooms to promote a fine coat. In this way they often do mischief; but as an addition to other stomachics, when necessary, they may be still properly made use of.

Gruel is an article of no small consequence in the veterinary materia medica, inasmuch as it is bland, mild, and diluting. In making it, care should be had to its intention. If as a cordial or for nutriment, it ought to be thick; if as a diluent, it cannot be too thin. It should likewise, when made, be perfectly clean and free from smoke. Ignorant servants are apt to think any thing sufficiently clean for a brute, without being aware that the most delicate female is not half so susceptible to unpleasant sensations from dirt, as is the horse. If this animal once has gruel offered to him that has been smoked, it is only by force that he will ever after take any. A useful diluent is also made from bran, by pouring boiling water on it, when it is called *bran tea*. It should be strained when cold.

Gum.—This is a juice that flows from various trees and plants, and inspissates by heat. The gums in use in human pharmacy are numerous; but they are fewer in veterinary practice. *Gum arabic* and *Gum tragacanth* are both sometimes used in pectoral drinks, and other demulcent medicaments.

Gum Resins are compounded of gum and resin. *Gum ammoniacum* is sometimes used in chronic cough, but with doubtful advantage. *Gum guaiacum* is now very seldom used; *Gum dragon* has shared the same fate. *Gum myrrh:* This has outlived the reputation of the others; but it is questionable whether its virtue as a cordial, in the usual acceptation or meaning of the word, is not ideal; but as a permanent tonic it ranks higher.—See Tonics.

Hartshorn, Spirit of (*Aqua carbonatis ammoniæ*).—The carbonated water, or spirit of ammonia, is convenient in veterinary practice, from its peculiar property of uniting oil and water. Internally, it is an antispasmodic in doses of eight to ten drams. United with acetous acid, or vinegar, it forms an excellent diaphoretic febrifuge. (See Mindererus's Spirit.) And in conjunction with equal parts of oil, it forms the *volatile liniment*, which is a warm discutient application, much used for sore throat and indurated tumours.

Hellebore, white.—This root is useful for the cure of mange, either pulverized and mixed with lard, or boiled into a decoction. Mr. White informs us that he cured a horse of farcy by giving half an ounce daily. I have, however, found it so violent in its effects, as to be forced to desist from its use. In such cases it may, however, be tried, beginning with two drams.

Honey is an article of importance in the veterinary pharmacopœia, not only as it is a usual medium for making balls with, as well as ægyptiacums; but also as it forms, in conjunction with vinegar, the simple oxymel, an article that should always be at hand, and which should never be made with sugar for cheapness; as there is little doubt but that the honey is in itself a demulcent and balsam of much virtue. And provided the veterinarian orders from his druggist the foreign honey, and watches his time for purchasing it, it may be obtained for 6*d*. 7*d*. or 8*d*. per pound. But this kind will be found too thin to form balls with; and, indeed, honey is so apt to ferment, that

it should never be used in this way, but when the mass is intended for immediate use.

INSTRUMENTS.—Veterinarians are not sufficiently careful relative to their instruments, which should be kept in the best order, and always ready for immediate use. The lancets, fleams, &c. purchased at cutlers, are too apt to be procured wholesale from Sheffield or Birmingham, where the tempering is not sufficiently attended to. But the veterinarian who is curious in this respect, will do well to furnish himself from Mr. Long, of Holborn, London; who is, I believe, the only professed veterinary instrument maker in England. Here may be seen all the improvements that have taken place either from the suggestions of the various practitioners in this art, or from the ingenuity of Mr. L. himself; whose attention to this useful branch of the arts is acknowledged. For the use of veterinarians, I have, at Mr. Long's request, added a List of Veterinary Instruments as manufactured by him.

INFUSIONS are different from decoctions only, by the articles being *steeped* together instead of boiled.

IPECACUANHA.—This valuable article, in human practice, seems inert in the horse. I have given it in various doses, and under various circumstances, without having witnessed any effect from it.

IRON.—Almost all the preparations from this metal prove excellent tonics to the horse. Iron filings *(limatura ferri)* may be given in the corn or a mash, in doses of two or three ounces once or twice a day. The rust, or carbonate *(ferri carbonas)*, is another form, and proves useful when given as the former in doses of one ounce to two. Green vitriol, or copperas as it is called *(ferri sulphas)*, is also given as a tonic, and some think it a preferable preparation, on account of its saline admixture. It is usually given in a daily dose of four to six drams. All the preparations of iron appear to produce most effect when combined with aromatic bitters.

JALAP, though so strong a human purgative, is totally inactive in the horse.

JAMES's POWDER.—See ANTIMONY.

JAPAN EARTH.—This erroneous term has been long applied to an inspissated juice now called *catechu;* which see.

JUNIPER.—The berries are now and then given, but more frequently the essential oil is used as a warm stomachic and slight diuretic.

KALI.—See POTASH.

LARD.—Many practitioners are at a loss for a substitute for lard, which forms the basis of most of their unctuous matters. When, however, lard cannot be procured, or is extravagantly dear, the fatty matter called *palm oil*, which is of the same consistence, may be always obtained; commonly at less than a shilling a pound.

LAUDANUM.—The liquid preparation or tincture of opium.—See OPIUM.

LAXATIVES may be denominated a milder purgative, but acting

without irritation, and hence much to be preferred in violent inflammatory affections. In some chronic cases, also, they are eligible, because they can be more frequently repeated. Of this latter kind are calomel with small doses of aloes. The laxatives proper in febrile cases are Epsom, Glauber's, or, in default of these, common salt, four to eight ounces, dissolved in thin gruel, and repeated every six hours till it operates. In some cases, as bowel affections, from eight to sixteen ounces of castor oil form the best laxative: not but even here the effect may be hastened if a quick relaxation is requisite, by neutral salts without danger. The action of laxatives is much assisted by diluting drinks, bran mashes, raking and clysters. Indeed, both bran mashes, and clysters, are of themselves in many cases sufficiently laxative. Grass, particularly that of the salt mashes, forms also an excellent alterative laxative.

LEAD.—Several preparations of this metal enter into veterinary practice. The principal of these is the

Lead, Sugar of (Superacetas plumbi).—In the former dispensatory, this was called the acetate of lead; but it is still familiarly known by the old term of sugar of lead among farriers; originally so called from its sweet taste. It is of much importance in veterinary practice, forming a more convenient, and I think a more efficacious, mode of making *Goulard water*, as the solution of it is popularly called; but which water has been usually made from a preparation of litharge, called extract of saturn, or Goulard's extract. When this celebrated liquor is made from the dry acetate, do it as follows:

Goulard Water.—Take sugar of lead, one dram to two; soft water, a pint. When the extract is preferred, make as follows:—Extract of saturn (*liquor plumbi acetatis*), one dram to two; proof spirit the same; soft water a pint. Either of these preparations of the acetate of lead are excellent, and justly appreciated applications, in superficial inflammations; but, to produce the full effect, the part affected should be kept constantly wet with one or the other of them. Internally, this preparation is inert: even four ounces have been given without producing any visible effect.

Lead, White (*Plumbi carbonas*).—White lead is sometimes used as a desiccative, being sprinkled over a sore.

Lead, Litharge of (*Plumbi oxydum semivitreum*).—From this the celebrated extract of Goulard is made, which, infused in water, produces the Goulard wash, but which I prefer to make of the superacetate or sugar of lead, as it is erroneously called.

LIME is, in some cases, when *quick*, a useful caustic; and, when pulverized, is found good to sprinkle over cankered feet, greasy heels, or any foul surface, where an absorption of moisture, as well as an escharotic process, are desideratums.

LIME WATER.—Six pounds of lime, infused in two gallons of water, may, after standing three or four hours, be strained off, and kept in a *close stopped* bottle for use, without which care it will be useless. Lime water is a good application for mange, and is also

sometimes recommended internally for obstinate coughs and gravelly complaints.

Liniment is a fluid preparation of oil and other matters.

Linseed.—The seeds boiled form a thick mucilaginous demulcent drink, useful in catarrh, sore throat, and all chest affections. *Linseed powder* makes a convenient poultice, particularly where a close application of the poulticing medium is required.

Liquid Blister.—See Blister; see, also, Sweating Blister.

Liquorice, like linseed, entered into the composition of numerous old recipes; but, in this way, the virtues of neither, particularly of the latter, are very conspicuous.

Litharge.—See Lead.

Lotions.—See Washes.

Madder.—Much dependence used to be placed on the virtues of this, among old farriers, in diseases of the stomach and liver, as well as in farcy. It was also considered as a preventive against the effects of venomous bites. In farcy, I have witnessed some good from it, but not enough to deserve particular attention. In other respects, I believe it does not merit much notice.

Malt.—This forms an excellent cordial in cases of debility, and, when continued, it becomes a permanent tonic. It has also some pectoral qualities; but in active inflammations of the chest it is too stimulant. Malt is also an excellent alterative. In farcy, in grease, and in mange also, when accompanied with emaciation, I have used it with extreme efficacy: but, in such cases, it should be given in considerable quantities without other corn, and even with as little hay as possible, so that almost all the nutriment received by the constitution may be by the malt. This practice is not generally known, but it has proved with me, in some cases, singularly efficacious. The best mode of giving malt is by mashes.—See Mashes.

Marshmallows.—Either the leaves, stalks, or roots, when boiled, yield a mucilaginous liquor, formerly much used as a fomentation, and occasionally given internally as a demulcent; but it has fallen into disuse.

Mashes are much in request in stable management, and are made from oats, barley, bran, malt, linseed, and sometimes chaff. They are also given cold or warm; but, in either case, should always be hot when made. In making them, care is necessary to avoid smoking the water, and not to stir them with any thing dirty, or the horse, being a cleanly animal, will refuse them. The mode of making is sufficiently known: boiling water being poured on the bran, corn, or whatever is the subject of the mash, to the consistence, when stirred, of a poultice; it should be covered over, and suffered to remain an hour or two, unless it is to be given hot to steam the head, as in catarrh; but even here it should not be hung round the neck immediately, or it would alarm the horse. Some horses will not readily eat bran mashes without a handful of

corn to make it palatable. When horses are weakly and much emaciated, it is prudent often to mash all their corn. The quantity intended for them the ensuing day may be put into a vessel the over night, and boiling water poured on it. In this way it is rendered more easy of digestion, and hence more nutritive. *Speared corn* has been sometimes recommended in the course of the Work; which is nothing more than malting a quantity, by putting cold water to it for twenty-four hours, and then spreading it on a floor two inches thick, which will soon make it sprout, when it may be given. In this way, it must be made from day to day, or it will become musty or mouldy.

Mercurials.—The various preparations of *quicksilver* are so called, and may be seen under their several names, as calomel, corrosive sublimate, lunar caustic, &c. &c.

Mercurial Ointment (*Unguentum hydrargyri*).—Unless the utmost confidence can be placed in the druggist employed, the practitioner would act prudently in making this ointment himself; for it is too common to adulterate it: indeed, it is hardly possible to purchase it of a druggist of the strength prescribed by the pharmacopœia. It is a useful assistant in mange ointments. Before blistering, or firing a splent, it may be rubbed on the part for a week, with benefit. When it is used extensively, its effects should be watched, as, sometimes, a small quantity will salivate. I once affected the mouth of a horse of my own, by rubbing in three drams daily for three days only.

Mindererus's Spirit (*Liquor ammoniæ acetatis*).—This is made by pouring a quart of vinegar on an ounce of volatile salt of ammonia. It may be also made by taking any quantity of spirit of hartshorn, and adding vinegar to it till it tastes neither salt nor sour. I consider it as a very important medicine in horse practice; it gently invigorates, is diaphoretic, and sometimes it proves mildly diuretic. It principally shews its salutary effects on the commencement of the debile stage, or at the close of lingering febrile diseases, particularly of the epidemic catarrh; in which cases it may be combined with camphor, but more particularly with powdered camomile (see Camomile). In the more early stages of the epidemic catarrh, it may be united with nitre and oxymel. The dose is from four to six ounces. In strains and ligamentary lamenesses it forms a very useful external application also.

Mint and Peppermint.—See Oil.

Myrrh.—This excellent gum resin is a valuable tonic to the horse, in doses of an ounce, particularly if united with salt of steel, and any warm bitter. There are two tinctures of it; one simple, and one compounded with aloes: both of which are much used externally as warm digestives.

Narcotics are not altogether similar in their action to antispasmodics or anodynes; but the analogy is so considerable, that, in the present instance, it is not necessary to separate the consideration of

them from what lessens irritation and eases pain.—See ANTISPASMODICS and ANODYNES.

NATRON.—See SODA.

NITRE (*Nitras potassæ*).—The nitrate of potash is the most powerful refrigerant we know. It greatly diminishes febrile action, and determines more certainly to the kidnies than any of the saline articles we use. It is also antiseptic and diaphoretic, and therefore of great consequence in active fever, given two or three times a day in doses of three or four drams. As an alterative it is also well known.—See ALTERATIVES.

Nitre, Sweet Spirit of (*Spiritus ætheris nitrici*).—This is a valuable preparation of nitre, inasmuch as it is a refrigerant, and yet, in some measure, a cordial, from its æthereal composition; therefore it is a useful medicine in the more advanced stages of fever, in doses of an ounce two or three times a day. It is also a useful article to give in the immediate approach of the first cold fit of fever, in a dose of two ounces.—See FEVER.

NITROUS ACID (*Acidum nitrosum dilutum*), or *aquafortis*.—See CAUSTICS.

OAK BARK.—See BARKS.

OILS.—These are either fixed or volatile. The *fixed oils* are so called because they are not liable to be changed into vapour but under a high degree of temperature, and are also generally gained in quantities by expression. The *volatile oils*, on the contrary, are produced by distillation, and evaporate by a moderate heat. The fixed kind, in horse practice, are:—

Oil of Elder, which is only common oil tinged with elder, or sometimes with verdigris.

Oil of Bay is an expressed oil from bay berries.

Oil of Castor.—See CASTOR OIL.

Oil of Olive.—The best olive oil may be substituted for castor oil, when the latter cannot be obtained. It is the principal medium in the composition of liniments, and enters into many ointments.

Oil of Linseed.—This is considered as a pectoral by the older farriers, and was formerly much used in coughs, but is now seldom given.

Oil of Palm.—Country practitioners hardly know there is such an article as this, which has the consistence and all the other properties of lard, with the addition of a most fragrant smell. In quantities it may be also purchased cheaper than lard, and, as it does not become rancid, it is greatly to be preferred.

The *essential* or *volatile* oils are,—

Oil of Amber.—An antispasmodic not much in use. It is said to have a peculiar property of hastening the action of aloes.

Oil of Anise Seeds.—This is an elegant warm aromatic, and may very properly be added to cordial balls, in doses of ten to thirty drops.

Oil of Caraways may be used in the same way, and considered in a similar point of view.

Oil of Juniper.—This is often added to diuretic balls, to increase their effect. It acts, however, principally as a warm aromatic.

Oil of Lemon.—This is principally used to disguise the smell of nauseous articles. I have, however, given it in colic with much benefit. In one instance, two ounces, with four ounces of common oil, produced immediate relief.

Oil of Petre is only Barbadoes tar in oil of turpentine.

Oil of Tar is a cheap penetrating distillation from tar, that may be substituted for turpentine.

Oil of Turpentine.—See TURPENTINE.

Oil of Origanum.—This warm penetrating oil was formerly much used among farriers as an external stimulant; but it possesses no powers superior to turpentine, and is therefore little used by modern practitioners.

Oil of Spike.—To this, also, the older farriers attributed superior efficacy, although it was nothing more than oil of turpentine coloured with alkanet root.

Oil of Vitriol.—See SULPHUR.

OINTMENTS are greasy applications for covering excoriated surfaces. The numerous preparations of this kind are much reduced in number; for, although some certainly have a salutary influence on a wound, yet, after all, their principal merit is in the defence they afford.

ONIONS.—In domestic practice the juice of three or four onions in half a pint of sound ale or gin, has relieved flatulent colic. The French, in such cases, introduce a large one up the anus.

OPIUM.—I believe it has been attempted to prove that this valuable antispasmodic is nearly inert in the horse; but, let the student be aware that no theory can overturn facts; nor any private views long smother public benefit. Opium has a most salutary and active effect on the horse. In spasmodic colic its benefits are particularly observable in doses of two to three drams; in which cases, also, it may be given in clysters as well. It greatly assists the action of astringents in diarrhœa; and, in profuse staling, united with alum and catechu, it has proved singularly efficacious; as also in difficult staling not dependent on inflammation. In farcy and skin complaints, it combats the ill effects of too large doses of active minerals. It increases the pulse, in repeated doses of one to two drams every six hours; hence it is an useful auxiliary remedy in the debile stages of fever.

Laudanum is the tincture of opium, but it is too diffused for much use in horse practice, unless when a very small dose is required. A watery solution may, however, be made strong, and the whole given; that is, sediment and all.—See TINCTURES.

OPODELDOC (*Linimentum saponis compositum*) has given place to more active remedies; it may, however, be still employed in slight strains and bruises.

Origanum.—See Oils.

Oxymel, Simple.—This is made by simmering a pint of vinegar with two pounds of honey. Sugar is sometimes substituted, but this is never advisable, as it destroys, I am disposed to think, a considerable portion of the efficacy of the compound. Oxymel, properly made, will be found a most valuable remedy in pneumonia, and all catarrhal affections; particularly in conjunction with nitre, tartar emetic, and foxglove. The dose is from four to six ounces.

Oxymel of Squills.—In chronic coughs, or in catarrhal affections, where the cough remains obstinate, and yet no active fever is present, this may sometimes take place of the other, in doses of three to four ounces; but, as a general medicine, the other is greatly to be preferred.

Palm Oil.—See Oils.

Pectorals are medicines that exert their healing influence principally on the chest: thus they include expectorants, demulcents, and emollients. Pectorals, in horse practice, may be considered as of two kinds: such as allay inflammation, as the remedies used in pneumonia; and such as allay topical irritation simply, as those recommended in chronic cough.

Peppers.—The various kinds of peppers are sometimes used by farriers, particularly in colic. As a domestic remedy, either of them may be very properly given in doses of three drams to six; except the Cayenne, which, as being very strong, admits of only a dram as a dose. The peppers are sometimes used as a stomachic, or to warm other more permanent tonics, as steel, bitters, &c.

Physic.—See Cathartics.

Pitch is used to give a consistence and adhesiveness to plaisters and ointments; and is also the basis of charges. It has as much *medicinal* quality as its relationship with terebinthinated substances allows it.

Potash (*Potassæ subcarbonas*).—This is called *vegetable* alkali, in contradistinction to soda, which is termed the *mineral alkali*. Potash is, in itself, seldom used but as a caustic (which see); but its combinations frequently enter veterinary practice (see Cream of Tartar), which is the supertartrate of potash; and *nitre*, the nitrate of potash.

Poultices.—In veterinary practice bread would be too expensive an article to make poultices of in common cases. Bran, therefore, is very commonly used; and, to give it a proper consistence, some linseed meal, if thought necessary, may be mixed with it; or, in default of this, a little of any other meal. A *poultice* should be made of a sufficient consistence, that it may not run through the cloth it is put in; and yet it should not be so thick as to dry too quickly, for a poultice acts principally by its moisture; therefore it should be frequently wetted through the cloth with the predominating fluid, of whatever kind. In applying poultices to the legs, care should be taken not to tie them too tight, as is frequently done, and thereby the mischief aggravated instead of relieved. A piece of

broad list is, for this reason, very proper to fasten them on with. They should also never be applied too hot; very little good can be derived from it, and much pain may be occasioned. A hot poultice soon comes to the heat of the part; and as, in most cases requiring them, the part, at the moment of application, is in a state of comparative debility, too great heat only farther weakens it. Poultices are likewise, in many cases, applied cold, as in some strains, and in affections of the eye. A very convenient mode of applying a poultice to the extremities, is by means of an old worsted stocking cut off at the ancle. The leg of it being slipped over the hoof, is brought around the part, and secured below by means of broad list not too tightly applied. The poultice is then put into the stocking by means of the hand, and afterwards secured above by another piece of broad tape loosely applied; after which the top of the stocking may be folded down over it. In cases where it is found difficult to keep a poultice on any part of the extremities, from its inclination to slip down; still by no means tighten the supporting bandage; but, instead, pass a long tape from it over the withers, or back, if behind, and attach it to the other side of the bandage; it will then be effectually secured from slipping.

A common softening Poultice.

Bran, any quantity; pour on it boiling water, to form a thin paste; add linseed meal sufficient to make it adhesive. After this, stir in one or two ounces of sweet oil.

A cooling Poultice.

Bran, any quantity; pour on it a sufficient quantity of cold Goulard water to form a poultice; which, as it dries, moisten with more Goulard water.

Cleansing Poultices for Grease, or ichorous Discharges from other diseased Surfaces, or for gangrenous Wounds.

Oatmeal . . . . . half a pint,
Linseed meal . . . . . ditto,
Powdered charcoal . . . . . four ounces,
Stale beer grounds, sufficient to make a poultice.

Or,

Carrots, scraped, sufficient to make a poultice.

Or,

Boil and mash turnips, sufficient to make a poultice.

To either of these, four ounces of powdered charcoal may be added, if thought proper. Or,

Linseed meal, or oatmeal flour, any quantity; mix with boiling water, and ferment with a table spoonful of yeast: as it rises, apply to the part.

In cases of extensive gangrene, an ounce or two of oil of turpentine may be added to either of these poultices.

Powders.—Pulverized medicines, without much taste, may be conveniently given by mixing with a mash, or in the corn. If the latter, and the matters given are very dry and light, the corn should be first sprinkled with water, to prevent the powder being blown away by the horse breathing or snorting. But whenever a horse is deli-

cate in his stomach, and refuses his food on this account, it should not be persisted in.

Precipitate, Red (*Hydrargyri nitrico oxydum*) is the red nitrated quicksilver of the former dispensatory (see Caustics). The white precipitate is seldom used among brutes.

Purges.—See Cathartics.

Quassia, a useful bitter in doses of six to ten drams.

Raking is a method of emptying the bowels by means of the hand. The right-hand arm being stripped and oiled, with the left hand the tail is drawn aside, when the right being made as small as possible, and cone-like, should be gently introduced up the fundament, and any quantity of hardened excrement the hand meets with carefully removed in small pieces. From this it will at once be evident that *back raking* must be useful in a vast variety of cases. It should always be made use of previous to giving a clyster, otherwise the hardened matter may prevent the passage of the fluid. It is also always proper in colic; and in all cases of costiveness it should never be dispensed with.

Repellents.—Medicines whose action was supposed to consist in driving back humours from one part to another. Modern physiology allows no such action; and it appears, from the theories now received, that all repellents, as they were termed, act simply by their tonic power.

Resin, commonly called rosin, is either yellow or black. The yellow is the one used in veterinary practice; internally as a diuretic (see Diuretics); and, externally, in charges, plaisters, &c.

Roses, Red Conserve of.—See Conserves.

Rowelling.—Rowels act like blisters by inflaming the surface, whereby more deep-seated inflammations are removed; but it is evident they cannot act either so quickly or so extensively; yet they are more convenient often, and more permanent in their action. The common mode of making a rowel is sufficiently known. A slit being cut in the skin, about an inch in length, the finger, or a blunt horn, is introduced to separate it from the surrounding flesh, in a circle of two inches in diameter; into which is introduced something to prevent the reunion of the skin. A piece of circular leather tolerably stiff, with a central hole, is a very common substance used. When the inflammation to be raised is required to be speedy, this leather is smeared with blistering ointment, otherwise with basilicon. By the improvements in veterinary instruments, a bistory is now used, that renders the introduction of the finger unnecessary.—See Instruments, at the end.

Rue, joined with box, has been thought to be an antidote to the effects of the bite of the rabid dog. I have myself witnessed the preventive powers of this mixture; but I am disposed to attribute the principal efficacy to the box (see Rabies, p. 453). As a remedy in farcy, worms, and grease, in all which it was formerly used, it has little virtue.

Saline Embrocation.—See Embrocations.

Salts are divided into acids, alkalies, and neutrals.

Common Salt.—This is a useful remedy in veterinary practice; for when Epsom or Glauber's salt cannot be conveniently got at, this may be substituted as an aperient. It also proves itself a vermifuge, and in solution assists the effects of opening clysters. It may be given in doses of from six to eight ounces. In the proportion of a dram to six ounces of water, it has been found an excellent collyrium for ophthalmia when the first inflammatory irritation has subsided.

Sal Ammoniac (*Ammoniæ murias*).—*Crude* sal ammoniac, so called in contradistinction to the volatile or prepared ammoniacal salt before described, when dissolved in vinegar, is an excellent application for torpid swellings, strains, and bruises; but is not more efficacious than the saline embrocation, which see.

Sal Indus.—A new salt, said to be an excellent vermifuge, particularly against bots, but I have always found it nearly inert. All salines however are, in some degree, vermifuges, and more particularly to bots.

Salt of Steel.—See IRON.

Salt of Tartar.—See POTASH.

SAVIN.—This was formerly strongly recommended as a powerful vermifuge. I have sometimes seen worms come away when it has been given, particularly by considerable doses of the essential oil, as five or six drams; but I consider it altogether as less efficacious than those vermifuges already noticed.

SEA WATER.—For the same purposes that common salt is given, sea water may also be employed in doses of two or three pints. Some horses will drink it of themselves; and persons living on the sea coast affirm that it is not uncommon for a horse out of condition to break away and go to the sea side to drink, as though impressed with an instinctive knowledge of the efficacy of it as an alterative or vermifuge. It is remarkable, however, that horses on the sea coast seldom carry a fine coat, which can only arise from the action of the sea air on them.

SODA is the *mineral* alkali, whose medicinal properties do not differ materially from potash, or the vegetable alkali, which see.

SPANISH FLIES.—These are, or ought to be, the principal stimulating ingredient in the making of blisters; and every veterinarian should purchase them whole and powder them himself; otherwise he will be very apt to buy them adulterated. Previous to being powdered they should be moderately dried, and then leisurely pounded, or rather ground into a powder, the operator guarding his face with a fine muslin handkerchief, so as not to receive the fine particles into his nose and throat, otherwise an unpleasant sense of soreness will arise. If they are very dry, and the powder flies much, add a few drops of sweet oil, which will prevent this.

SQUILLS (*Scilla maritima*).—Squills are highly recommended by Mr. White; but I cannot speak in equal terms of their efficacy in the cases I have tried them. As an expectorant, however, they may, perhaps, assist other remedies.—See OXYMEL OF SQUILLS.

STARCH.—In diarrhœa, starch clysters have proved very useful. It may also be given internally in such cases, united with chalk and opium.

STIMULANTS are medicines that exert an influence on the system, by increasing the power and action of a part, or of the whole of it; hence they may be considered as very numerous, and the term as of very extensive signification: but the veterinarian's purpose will be fully answered, by considering the various stimuli under the heads CORDIALS, STOMACHICS, and TONICS, which see.

STOMACHICS are intended to express such medicines as act more immediately by determining a greater quantity of blood to the stomach, hence increasing the secretion of its gastric juice, as warm spicy bitters, &c.; or those supposed to act by strengthening its muscular tone, as bark, steel, acids, &c. Hence stomachics are only a more permanent cordial or stimulant. The remedies that may be considered as meriting this appellation, beyond those abovementioned, are diffused through the *Materia Medica*. The following formulæ will, however, be a clue to the veterinarian, and either of them will, on trial, be found to answer the end proposed.

Oak bark	six drams,
Aloes	one dram,
Ginger	one dram,
Blue vitriol	one dram.

Make into a ball with honey, lard, or conserve of roses.

Oak bark	four ounces,
Watery tincture of aloes	four ounces,
Ginger, in powder	half an ounce,
Forge water	three pints.

Boil the oak bark first, bruised, in the forge water, and when cold add the infusion of aloes and ginger, and divide into four drinks.

Gum myrrh	two drams,
Mustard flour	one dram,
Opium	five grains,
Camomile powder	four drams,
Camphor	half a dram.

Make into a ball with thin Venice turpentine.

Powdered gentian	four drams,
Powdered quassia	four drams,
Powdered opium	five grains,
Oil of juniper	twenty drops.

Make into a ball with Venice turpentine.

STOPPINGS are articles introduced into the hollow of the bottom of the hoof, to moisten the horn; and in other instances also, as in cases of pricks, corns, or bruised soles. For the first purpose, any thing that will retain moisture may be used: the following will be found as good as any, as it not only moistens but toughens the horn.

Cow dung and horse dung, mixed	six parts,
Tar	one part.

Clay is not a good stopping. It dries too soon, and then rather adds to the evil of hardening the hoof than diminishing it. In cases of pricks, &c. hot tar is not improperly used as a stopping. Pieces of tow are dipped into it, and are then retained by means of tough strips of wood, as withy from the broom binding, which may be laid across. Oil of turpentine one part, horse turpentine one part, and grease a third part, make also a good warm drawing stopping for similar purposes; but it should be always first considered whether the case requires stimulating.

STORAX.—See BALSAMS.

STYPTICS are remedies that restrain hæmorrhage, either internally or externally. Those used in the former case are vitriol, alum, and catechu; in the latter, vitriol and alum, together with such articles as coagulate the blood either mechanically or chemically, and thus plug up the open vessel.

SUBLIMATE.—See CORROSIVE SUBLIMATE.

SUDORIFICS.—These are uncertain remedies in the horse. We can procure a slight relaxation of skin, by diluents, warmth, and diaphoretic medicines; but actual perspiration we can seldom excite, except by violent means. Vinegar, however, in frequently repeated doses of six ounces, will generally do it; but it appears to excite much action in the system, and hence not to be recommended. Warm cloathing will at any time do it; but as it occasions increased action to a considerable degree, so this also does more harm than good. Such being the case, we must content ourselves with gently relaxing the skin by nitre, neutral salts, Mindererus's spirit, diluents, and antimonials.

SULPHUR.—Flower of sulphur is a very common remedy in veterinary practice, internally as an alterative, and externally as a cure of eruptions of the skin. For the latter purpose, the black sulphur, which is cheaper, is equally proper.

SULPHURIC ACID, or Oil of Vitriol (*Acidum sulphuricum*), as it is popularly termed, is a preparation from sulphur, which is seldom used in horse practice but as an escharotic, or added to blistering substances to increase their activity.

SULPHUR, BALSAM OF (*Oleum sulphuretum*).—Brimstone, boiled in oil, was used formerly to be called a balsam; and was then much used among farriers in old coughs, and thick wind; but, as may be supposed, with little advantage. Annisated balsam of sulphur was made by adding oil of aniseed to the former.

SULPHATE OF COPPER.—See BLUE VITRIOL.

SWEATING BLISTER.—This is only a more mild epispastic, and simply occasions heat and swelling, without excoriation or loss of hair; consequently it is a very convenient application, when it is an object to avoid a blemish, and when the case is not a very desperate one. But there are also instances in which it is to be preferred to an actual blister, as in recent strains, where the whole of the heat and inflammation is not yet abated: in such cases the sweating blister is often very efficacious. The mode of application is to apply it by rubbing

it in of sufficient strength to irritate in a mild degree only, rubbing it well in every day, until considerable swelling is occasioned, when the application should be desisted from, and the swelling suffered to subside. The formulæ for sweating or liquid blister is among BLISTERS, which see.

SWEET SPIRIT OF NITRE.—See NITRE.

TAR is a very useful article to the veterinarian. Equal parts of tar and fish oil make an excellent application for the hoofs of horses, applied daily with a brush, the hoofs being previously moistened. Tar is also an excellent stopping for the bottom of the feet, in the proportion described under STOPPINGS. It is also either alone, or mixed with oil of turpentine, and applied warm, often used with advantage as a stopping in pricks and bruises of the sole. Tar enters also into some of the digestive and detergent unguents; particularly in preparations for the cure of thrushes in the feet. Tar has also been given inwardly in balls, and the water of tar as a drink, in obstinate chronic coughs; and when joined with expectorants and alteratives, particularly of the mercurial kind, benefit has been often received from it in these cases.

TAR, BARBADOES.—This is valued more highly as an internal remedy for coughs, than the common tar; but, as far as my experience goes, it merits no preference.

TARTAR.—See CREAM OF.

TARTAR EMETIC.—See EMETIC TARTAR.

TENTS are substances introduced into a wound, to prevent its too early closing. In deep wounds having a narrow outlet, and when any foreign body remains to be expelled, they may be very properly employed; and any soft substance, as lint or tow, may be introduced for this purpose. But the old plan of the farriers, of cramming every wound with tents, is an absurd and hurtful practice.

TIN.—This is given as a vermifuge to horses frequently. It has however but moderate efficacy, and, when given, it should be always in fine filings, and not levigated, as there is reason to believe its action is purely mechanical; in which case, tin must be preferable to pewter filings as being harder, but which are generally substituted. Dose, three ounces daily.

TINCTURES are solutions of vegetable or other matter in spirituous liquors. When any of the resinous gums are to be dissolved, pure spirit of wine should be used. When the roots, bark, leaves, &c. of plants are to be made into tinctures, dilute spirit is sufficient. Tinctures are not, in general, a convenient formulæ for the veterinarian. The substances employed are too diffused, and cannot be given in general cases in sufficient quantity, without using an unnecessary and even hurtful portion of the spirit or menstruum. But as sometimes it may be wished to give either aloes or opium diluted; so a watery solution or tincture might be wished. In these cases, equal weights of the substance and of proof spirit may be digested together in a warm place for two days, and then the united articles may have double the weight of water added; and in this state the tincture may

be kept for use. In giving it, the bottle must be shaken, and the sediment and all poured out. Any of the tinctures of the human pharmacopœia may occasionally be employed in veterinary practice, but, for the above reasons, this will never be a very useful formulæ. The principal ones in use are tincture of aloes; tincture of aloes with myrrh; tincture of benjamin compounded, called friars balsam; tincture of myrrh; and tincture of Spanish flies. All these are principally in use as detergents. Internally also, all of them, except the tincture of aloes, are stomachics and tonics. Tincture of catechu likewise may sometimes be useful in restringent drinks. The tincture of opium also made as above, or a stronger laudanum, would be useful. Foxglove, as being a powerful remedy, may be very usefully given in tincture; and for convenience, the veterinarian may keep this also of double strength to what is ordered in the Pharmacopœia.

Tobacco.—This is a very powerful narcotic. An instance is mentioned by Mr. White, of two ounces having been given by an ignorant groom to produce a fine coat, which occasioned almost immediate death. But this very activity, when we are better acquainted with its mode of action, may be made subservient to important medicinal purposes. Externally, tobacco is very useful in infusion, as a remedy for mange.

Tonics are supposed to exert their influence on the muscular fibre, and to improve their tone: this they do, in some instances, through the medium of the stomach, and are then called stomachics (which see); or they are received into the blood, and then become a very part of the fibre themselves. *Tonics* are, therefore, stimulants of permanent action; and from which may be gained, that this class is numerous, and is, in fact, diffused through the whole materia medica. A complete knowledge of their numbers and their effects can only be gained by an intimate conversance with the animal economy, and the nature of the various foreign agents employed in acting upon it. As a guide to the junior veterinarian and amateur, a few formulæ that I have found by experience to be efficient are added, each of which may be given daily.

Gum myrrh	three drams,
Green vitriol	two drams,
Oak bark, powdered	three drams,
Ginger, ditto	one dram.

Mix into a ball with conserve of roses; or into a drink with a pint of camomile tea.

Arsenic	ten grains,
Gentian, powdered	three drams,
Cascarilla, ditto	three drams.

Mix into a ball with conserve of roses, or, as above, into a drink.

Gum myrrh	three drams,
Balsam of Tolu and of Peru, of each	one dram,
Liquid storax	ditto,
Levigated rust of iron	two drams.

Make into a ball.

Lunar caustic, fifteen grains, dissolved carefully in strong camomile infusion, one pint, forms likewise a most excellent permanent tonic to the horse.—Or,

Blue vitriol	half an ounce,
Ginger	one dram,
Powdered willow bark	three drams.

Make into a ball with conserve of roses.

In cases where either the sulphate of iron or the sulphate of copper is used, I would recommend that it is not given on an empty stomach, but after the horse has had about two quarts of water and a lock or two of hay.

Turner's Cerate.—See Cerates.

Turpentine forms an article of very considerable importance in veterinary medicine. There is no great difference between the Venice and the common, which are the kinds principally used in our practice. Turpentine is a considerable ingredient in digestive and blistering ointments, and is also a convenient adhesive medium for forming balls. Internally, it is a warm stomachic; an excellent assistant diuretic; and has some vermifuge powers.

Turpentine, Oil of.—This terebinthinated preparation is still more in use than the massy turpentine. Internally, in doses of two to four ounces, it forms an excellent antispasmodic in flatulent colic, and in similar daily doses it is one of the most effectual vermifuges. In both chronic and acute indigestion it is also serviceable. Externally, its use is still more frequent: it is a ready and never-failing stimulant, and hence it is the basis of the sweating blister; and, more dilute, it forms the best application for old strains and bruises.

Unguents.—A derivative name for ointments; which see.

Verdigris (*Ærugo*).—Internally, this subacetate of copper has been given in daily doses of two to three drams, and sometimes with success; but it does not appear, from what I have seen of it, to merit the exclusion of more appreciated remedies. It has, however, some power as a tonic, and, in this point of view, may be properly administered. Externally, its benefits are more apparent, as it proves one of the best detergents and mild escharotics with which we are acquainted. Mixed with honey, it forms ægyptiacum, and is used in ulcers of the mouth, and likewise as a paste to other ulcerated parts. Mixed with tar, it becomes one of the best applications for thrushes, grease, and cracks.

Verjuice is only an apple vinegar, and hence applicable to similar purposes with the common kind.

Vermifuges.—See Anthelmintics.

Vesicatories, blistering articles.—See Blisters.

Vitriol (*Sulphas zinci*).—White vitriol, or sulphate of zinc, is an excellent styptic and astringent; it is also a good tonic, in doses of four to six drams. In ophthalmia it forms the best wash for the

middle and latter stages. It is also a good detergent in grease and other ill-conditioned sores.

VITRIOLATED COPPER.—See BLUE VITRIOL.

VITRIOLATED IRON.—See GREEN VITRIOL.

VITRIOL, OIL OF.—See SULPHURIC ACID.

VINEGAR (*Acetum*).—The acetous acid is very frequently used in veterinary practice; it is of the utmost consequence, therefore, that it should be pure. It is, however, unfortunately, very liable to be adulterated with, or wholly made of, vitriolic acid, and then becomes very unfit for use as an internal remedy, being changed into an active stimulant instead of a refrigerant. Vinegar, not neutralized by salt or sugar, is capable of proving very noxious to the horse. We have instances on record, of a pint of strong vinegar destroying life; but, neutralized with carbonate of ammonia, it forms a most excellent febrifuge, under the old name of Mindererus's Spirit. Neutralized with sugar or honey, it forms a valuable expectorant, called oxymel. As an external application, the acetous acid is likewise no less useful. In strains, bruises, and other local injuries, it is the base of the best remedies, either in combination with sugar of lead when active inflammation exists, or mixed with crude sal ammoniac, or the bay salt, to counteract the effects of distention.—See SALINE EMBROCATION.

VINEGAR, DISTILLED.—This elegant preparation is nothing more than the common vinegar deprived of its water and feculent parts, but is in no respect preferable for the purposes of horse practice.

WASHES are watery solutions, or infusions, of various substances, to be *washed* over the parts to which they are to be applied.

WAX, WHITE AND YELLOW.—The yellow is principally used by the veterinarian, to thicken and give consistence to ointments.

WILLOW BARK.—See BARK.

WORM MEDICINES.—See ANTHELMINTICS.

ZINC.—See VITRIOL and CALAMINE.

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